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TELEPHONE ENGINEER

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Up-to-Date Survey of Radio

Telephone Men Must Keep in Touch—In This Article They Will Find Some Pertinent Suggestions of How Radio May Affect Them and May Learn Where Opportunity Lies

By R. V. Achatz

Developments in the radio-telephone field continue to come rapidly and the subject continues to be one of absorbing interest to telephone men. The first feeling of apprehension lest the radiophone might seriously affect the telephone business has worn off as the uses and limitations of radio have become better known and telephone men are studying the situation carefully to determine what applications of radio may become useful adjuncts to the telephone service.

The vast field of possibilities opened up by the coming of this new method of communication, the rapid changes that have been taking place in it and the enormous amount that is yet to be learned about it, make it impossible at the present time to forecast with any degree of certainty what will be its ultimate place in providing communication between man and his neighbor, whether on the same street or in a distant place. On the other hand, it is useful to go over the situation from time to time in order to determine the trend of development and to learn the present status of the relationship between the radio and the wire telephone.

The present article is an attempt to summarize a mass of information and opinion collected from a number of sources and may serve to give a picture of the situation as it now exists.

Two Aspects to be Considered by Telephone Men

There are two aspects of the radio art that call for consideration by telephone men, first, its effect upon the services now given over wires and, second, the new types of service that may be given through its application in some form or other. Radio telephony itself is progressing along two distinct lines and each of these must be considered. In one form of radio transmission the energy is released and is allowed to travel broadcast in all directions from the sending station. In this form the signals or speech may be received by anyone who installs suitable receiving apparatus provided he is within range of the transmitting station. This type of transmission has been called "space radio." In the other form of radio transmission, the energy is guided by wires and reception can be accomplished only by those who have receiving instruments connected to the wire system which is attached to the sending apparatus. This type of transmission sometimes called "wired wireless" or "carrier current telephony and telegraphy" may be designated by the generic term "line radio." Both of these forms of radio transmission may affect the telephone communication system and, therefore, must be considered in a survey of the situation.

Radio Cannot Supersede Wire Communication

Wire telephony may be affected by the extension of the use of radio communication in the following ways:

1. Radio may supersede wire telephony.
2. Radio may be used to extend the range of wire telephony.
3. Radio may become a means of communication, auxiliary to that afforded by wire lines.

Obviously, the possibility of radio superseding wire lines can only refer to space radio. This has been discussed in many places and the opinion is universally held that there is no possibility that radio will ultimately displace the wire line. The limited capacity of the ether with its reluctant interference between stations, the unsolved problems of static elimination and of obtaining secrecy of communication as well as economic considerations are the safeguards of the wire systems against becoming obsolete on account of radio. There have been no new developments that warrant any modification of this opinion.

Radio as an Extension to Wire Lines

That space radio will come into extensive use in order to increase the range of telephone communication can not be doubted. Radio channels will provide communications to hitherto inaccessible places, to ships at sea and very likely between continents. Apparatus is already available which makes this possible, and improvements are being made continually. The outstanding example of this is the radio link in the Los Angeles-Avalon circuit. The linking of radio and wire circuits must still be regarded as being in the experimental stage and there is much to be done before it will be definitely known as to when such combinations will be economically justifiable. A. T. & T. engineers have been quoted as saying that the Catalina Island circuit is uneconomical and that the annual charge is 50 per cent of the investment. Even now a submarine cable thirty miles long is being considered to replace it. The unfavorable economic experience in this case, however, does not remove the possibility that there are locations where such installations are not justifiable.

The use of radio as an extension of wire lines is almost entirely a long distance proposition and will interest few telephone companies in the United States outside those operating extensive systems of long distance lines. It is of interest to the railroads as offering the possibility of communication with moving trains and of communication between the engine and caboose of very long freight trains. The apparatus will have to be much simplified and the cost of installation and operation reduced before it becomes practicable for these purposes.

Radio As An Auxiliary to Wire Lines

While radio will not supersede the wire lines and while in its present state it offers only limited possibilities as a means of extending wire lines, it has already demonstrated its utility as an auxiliary to wire communication. One of the great possibilities is in the use of radio as an emergency method of communication. This is of particular interest to long distance companies, to railroads and to power transmission lines. Frequently these companies are faced by a total failure of wire communication and auxiliary communication by radio would greatly facilitate operation in the emergency. In many cases, the simpler and less expensive radio telegraph will probably be found to be satisfactory, particularly by railroads which find it necessary to have skilled Morse operators in their ordinary operation.

Another auxiliary use of radio is the already demonstrated applicability of line radio, utilizing the existing lines. Even in its present development it furnishes the possibility of greatly increased capacity of the wire plant. The multiplex carrier current telegraph and telephone system developed by the A. T. & T. Co. requires very expensive terminal equipment and is only economical on lines of considerable length, perhaps four or five hundred miles. However, there is every reason to believe that simpler apparatus might be used to give one additional channel over an existing circuit. Many telephone companies are investigating this and it is not unlikely that some experimental circuits will be in operation within a short time. The operating cost of such a circuit would probably be high, particularly on account of tube renewals, but there are possibilities of using the carrier channel only to supply additional facilities during the peak periods thus reducing the time that the circuit would be in operation.

The possibility of operating such a carrier channel over existing lines would seem to be the most practicable use of radio by telephone companies among all the uses that have been discussed thus far in this paper. It is a matter to which the engineer and plant man who are experimentally inclined may turn with considerable hope of developing something that is worth while.

Radio Broadcasting Not Attractive to Telephone Companies

Turning now to the possibility of new services, not now given by the wire lines, the first thing that comes to mind is broadcasting, on account of the publicity which it has received in recent months. Briefly, the broadcast services have been entertainment, information, news, market reports, weather reports, police reports and time signals. In its practical development, up to the present, it has been limited entirely to space radio. Transmitting stations have been installed by manufacturers and dealers in radio apparatus, by department stores, by newspapers and by schools and colleges. Receiving apparatus has been purchased outright and installed by the user. Thus far the transmitting has been on an advertising rather than a commercial basis and as such has had little appeal to telephone companies.

The initial cost of a modern broadcasting station is high, in some cases running up to twenty or thirty thousand dollars and the cost of operation is large, even if the services of the entertainers are largely donated. There has been little incentive for the telephone company to engage in this expensive form of advertising and there has as yet been no satisfactory method suggested of obtaining payment for the service that is being given.

Unless some means is found of obtaining revenue sufficient to pay the cost of the service, the broadcasting field offers little opportunity for development by the average telephone company.

Broadcast Receiving Has Possibilities

It is in radio broadcast reception that is offered the most attractive field for immediate development by telephone companies. There are numerous ways in which the telephone company can participate in this phase of the radio business and the one or more adopted will depend much upon local conditions. A number of telephone companies have installed receiving stations and copy market and weather reports, regularly. These reports are given to subscribers upon request. In the case of market reports, the farmer or stock raiser is interested only in certain portions of the reports and only at certain times in the year. The telephone company acts as a clearing house and furnishes only the information that is asked for. This involves some expense to the telephone company and, like the broadcasting itself, can not easily be put on a revenue basis. Many companies recognize that this would constitute an addition to their service which would be desirable but which they can not afford to develop without some return.

One variation of the system just described is practiced by some companies. The service is not given upon request but the telephone company furnishes the service over spare pairs in its cables. The output of the amplifiers of the receiving set is connected to the pairs and only a receiver or loud speaker is installed at the premises of the subscriber. In this way a definite charge can be made for the service. This offers some possibilities but is limited in use being applicable only to sections of town where spare facilities are available. It can scarcely be made a comprehensive service, available to anyone in the community. As an entering wedge useful in educating people to the use of the service it may have its place in developing such a service.

Re-Broadcasting May be Practicable

Another possibility in the radio field is in what might be termed re-broadcasting. This would involve the use of line radio. Apparatus is already available which would make this possible. The high frequency current could be superposed on the existing wires and receiving sets leased to the subscriber just as telephone instruments are leased. A receiving station located at the central office could be used to pick up the broadcasted material and to excite the line radio transmitter. A very simple receiving set could be used at the subscriber station in the place of the elaborate equipment now necessary if distant stations are to be heard. This is particularly suited to rural districts where the use of radio is limited because the farmer has no means of keeping the storage batteries charged. Electric light and power companies have been much interested in this and, unless the telephone companies are on the watch, may develop a profitable form of business from it. Telephone companies have a natural advantage in that their networks of wires are better developed and they should take care not to lose that advantage if the development of this kind of service is practicable. If some pioneer in the telephone field can point the way, others will be quick to follow.

Merchandising Radio Apparatus

This brings the discussion down to the last, the easiest and the most immediate way in which the telephone company can profit from radio. This is by selling or leasing instruments. Most telephone companies in the past, have not regarded themselves as merchandising organizations and have evinced little desire to engage in this form of business. In this they may be overlooking an opportunity. The telephone man is in every community the man looked upon as being informed on communication affairs and his word regarding a radio installation would have more weight than that of

almost any other person. He also is equipped to make installations of radio apparatus and to take care of it after it is installed. Many people have delayed purchasing radio apparatus because they lacked confidence in the people who have been marketing it. They have seen it in novelty stores, in music stores, in department stores and even in five and ten cent stores and have some very reasonable doubts as to whether the people selling it know anything about it or have any interest in it except in the first, quick profit on the sales. It they could purchase a set from a concern upon which they could rely and upon which they could depend for assistance in case of trouble, they would be in the market.

In the smaller communities, the telephone man could easily engage in this business without detriment to the telephone business. Perhaps he too has, hitherto, been uncertain about the apparatus that was offered to him. This condition now is being relieved, as practically every large, reputable manufacturer of telephone apparatus has added a line of radio apparatus and parts. He now, can purchase of firms in which he has confidence because of their known integrity. No large investment would be required, as a sample set would be sufficient, and apparatus could be purchased on order. He could make a reasonable charge for installing the apparatus and for maintaining it after it is installed and could add the profit on this to his profit on the sale.

The advisability of doing this reaches beyond the immediate profit in the transaction. By so doing, the telephone man is familiarizing himself with radio equipment and its operation, he is maintaining his position in the community as the man who is best informed in communication matters and he will be the man to whom people will turn in case any new development of radio takes place that is of vital interest to the telephone business. He is in position to guide the future of the radio business in harmony with the interests of the telephone industry, rather than allow any adverse developments to injure his investments and opportunities.

Summary of the Present Situation

Summarizing the present situation, there have been no developments in recent months that have radically changed the relations between the telephone and radio arts. In the process of development there may come a number of practical applications of radio as an auxiliary to the telephone business. Many of these will not be applicable immediately but the telephone man must keep in touch with them so he can make the proper applications when opportunity offers. In the meantime, if he desires to do so, he may find a profitable field in the merchandising of radio equipment, and so maintain his position as the most important local representative of the electrical communication art.

Plan Phone Financing

Chicago, Ill.—Formation of a "first aid" financial organization for the relief of Independent telephone companies in temporary fiscal distress is to receive consideration from the Independent association's executive committee.

The association's program for 1923, as discussed at the Directors' meeting held at Hotel Sherman, Chicago, December 16, is to be concerned principally with betterment of management. To preserve and strengthen the Independent group and to attract capable executives to the Independent properties, these properties must be adequately financed; run down properties must be put back on their feet, the directors agreed. One of the association's most important tasks, as determined by the directors, was to prevent its member companies getting into such shape that selling out to the Bell was the only possible end.

Manufacturers told President MacKinnon, he repeated to the directors, that it would not solve the problem for them to carry the load of the struggling Independents until the operating companies got back on their feet. As the discussion proceeded it became plain, according to W. R. McCanne, "that the association had to make it its business to help its members and show them how to help themselves."

The motion was made by George R. Fuller that the executive committee consider the suggestions presented, formulate them and submit a plan for a financial organization that would care for the requirements of the member companies.

The newly elected executive committee, which is to consider the financing plan, consists of George W. Robinson, St. Paul, Minn.; R. E. Mattison, Lincoln, Neb.; H. L. Harris, Kansas City, Mo.; H. L. Reber, St. Louis, Mo.; W. F. Goodrich, La Crosse, Wis., and Frank L. Beam, Mt. Vernon, O. This committee takes over the work of the finance committees of previous years.

October 23-26, 1923, was set as the date of the next annual convention. Hotel Sherman, Chicago, again is to be the meeting place.

An increased budget to care for the greater work of the association during 1923, was approved by the directors.

The death of James C. Kelsey was regretted by the directors of the Independent association in resolutions which were ordered drawn up at the December meeting.

TO FINANCE COMPANIES

Texas District Meeting Considers Plan for Meeting Money Need of Members

Tyler, Tex.—A plan for a co-operative finance company to supply independent companies with long time credit for plant maintenance and extension is to be worked out by a committee of the Texas Independent Telephone Association appointed at the Tyler district meeting. Individuals, as well as Independent telephone companies may be stockholders in the finance organization, which will be along the lines of co-operative building and loan associations, if the plans of the sponsor of the idea, Judge Sam A. Lindsey, are adopted.

This finance organization was the outstanding development of the Tyler district meeting. The committee appointed to work out the plan for the financial body is to report at the Texas annual convention, to be held at Dallas in March.

Addresses on underground construction for small exchanges, made by R. W. Garner, on legal liabilities of telephone companies to the public, delivered by Hal M. Cox, and on public relations, made by George McQuaid, director of the Texas Public Service Information Bureau, were received with considerable interest by the hundred sixth district telephone men in attendance. Other valuable talks were made by J. C. Paxton, F. M. Moore, R. B. Still and Oscar Burton.

Lexington, Ky.—J. A. Sullivan has been elected General Manager of the Fayette Home Telephone Co.

Valuation in Rate Making

Chapter XI—Unit Costs

By Charles W. McKay, Associate Editor

To diverge, for a brief interval, from the topic under discussion—several thoughts suggest themselves, at the beginning of this new year, which have a very real bearing upon the subject of "Valuation in Rate Making."

Advocates of public ownership of the utilities have always flaunted in our faces instances where municipally owned electric light, heat and water plants have given cheap service and operated at profit. These cases, however, have not troubled us — to any serious degree—due to the fact that we know full well that there is always a "nigger in the woodpile." Either expenses have not been properly allocated — or they have been "absorbed" in some mysterious manner. Usually, there has been an ultimate exposé—which tended to clarify the local public atmosphere and set the subscribers to public utility service, to thinking for themselves—as to the relative merits of public ownership and **well-managed** utility ownership.

But the postoffice has always been an enigma. Large profits were claimed and the advocates of public ownership made much capital of the supposed success of the Postal Administration. Now at the close of 1922, General Dawes comes out with a clear, easily understandable, balance sheet which anyone who is grounded in the rudiments of modern business can readily digest. It would seem from General Dawes' statements that the postoffice is operating at a huge deficit—rather than at a profit. Furthermore, if we are to accept General Dawes' data at its face value—the Department has probably been operating at a loss for many years. General Dawes' exposé nullifies one of the pet arguments of the advocates of public ownership—until such time as the Postal Administration can "turn in" an efficient record.

To return to the subject in hand—in the last article the general subject of "Unit Costs" was introduced and an outline given of the method of analyzing material costs on the basis of five-year averages—as illustrated in Fig. 15.

After the average figures have been obtained, it is customary to add an allowance for "waste and loss." The fairness of including such an allowance will be apparent when it is remembered that small articles—such as bolts, lag screws, insulators and so forth—are frequently lost in the process of construction. In the case of poles and underground conduit, a certain amount of wastage is bound to occur—due to breakage in unloading from cars, trucks, and so forth. In the case of the cable and wire plant it is impossible to prevent wastage in connection with construction work. Allowances must be made for the splicing of cable and for odd ends of wire.

A usual allowance, in terms of percentage, to cover the item of waste and loss, is 2% of the average reproduction cost as determined by the method illustrated in Fig. 15 (as presented in the December installment).

After the material costs have been completed for the pole plant, it is necessary to evolve suitable labor unit costs. The general method adopted is the following:

A typical gang set-up is assumed—including the foreman, the workmen and helpers—and an estimate is made (such estimates always being based on past actual performances) of the number of poles of a given size and height this gang can set in a day. Knowing the labor rates paid to the various gang members, it is a comparatively simple matter to reduce the figures to a unit cost per pole set. If the five-year analysis period is being used, labor costs must be considered for each of the years included within the period and average figures determined.

In connection with the derivation of the pole unit costs, the following elements, or operations, must be considered for each size and type of pole —unloading (from the car), carting the pole from the car to the place where it is to be set, roofing, gaining, digging (excavating the hole for the pole), and, finally, setting.

Fig. 16 shows how these various items — or operations — are correlated in a typical cross-arm unit cost set-up. It will be noted that an allowance (in this case 15%) is made for "supervision." This supervision consists of a proportionate allowance of the wages and expenses of the foreman who directs, and sometimes actually participates in, the work of setting the cross-arms. The wages and expenses of the "straw boss" are, of course, included in the gang set-up. All of the general supervision — other than that provided for in the items under discussion—is included in the computation

Number of Items	Description of Items	Item Costs	Total Costs
1	10-pin standard	.....	.....
	120″ fir arm	.....	.....
10	1¼″ x 8″ locust pins	.....	.....
10	16d. nails	.....	.....
2	22″ cross-arm braces	.....	.....
2	⅜″ x 4″ carriage bolts	.....	.....
1	½″ x 4″ fetter-drive screw	.....	.....
2	1¼″ washers	.....	.....
1	⅝″ x 12″ machine bolt	.....	.....
2	2¼″ washers	.....	.....
	Total material		.....
	Waste (breakage) & loss @ 2%		.....
	Total material (including waste and loss)		.....
	Labor cost of placing cross-arm on pole		.....
	Field superision @ 15%		.....
	Total unit cost of cross-arm in place		.....

Fig. 16. Sample Form for Building Up Cross-Arm Unit Costs

of the collateral construction costs or "overhead" costs as they are sometimes called. The collateral costs will be discussed in a subsequent installment.

In addition to the actual cost of setting the poles there are certain auxiliary costs which must be computed separately. These include the cost of painting poles and the cost of stepping poles. The reason for a separate computation of these costs will be obvious when it is remembered that poles are frequently installed in a plant, unpainted and without steps. It is also true that the degree of painting (number of coats) varies and that poles are not always stepped in a uniform manner. As an illustration of the point last cited, many companies adopt the practice of eliminating the wooden steps at the base of the pole—the assumption being that the linemen are provided with climbers and will climb to the first iron step. An advantage of omitting the wooden step is that children are not likely to attempt dangerous experiments in pole climbing—in view of the fact that they cannot reach the first (iron) step.

Separate unit costs must also be evolved for the other items falling under the pole account — Interstate Commerce Commission Account No. 241 (for exchange plant and 251 for toll plant)—the cross arms, anchors, guys and so forth.

A typical form for evolving anchor unit costs (after the five-year averages have been obtained) is presented in Fig. 17.

Forms presented in Figs. 17 and 18, respectively, are for illustrative purposes, only. All cost data has purposely been omitted. The reason for this will be apparent to the reader if he but considers the rapid variation in prices that has taken place during the past few years. In presenting a series of articles of this nature it is dangerous to quote prices—they may be out of date shortly after the articles are published, and they may be misleading to the reader.

Number of Items	Description of Items	Cost per Item	Total Unit Costs
1	Patent anchor	.....	.....
2	Guy hooks	.....	.....
1	Crosby clip	.....	.....
1	2-bolt clamp	.....	.....
10	Pole shins	.....	.....
1	⅜" Thimble	.....	.....
2	Fetter-drive screws	.....	.....
20 (feet)	⅜" S&M strand	.....	.....
20 (feet)	#6 B. B. iron wire	.....	.....
	Total material		.....
	Waste & loss @ 2%		.....
	Total material, including waste & loss allowance		.....
	Labor:		
	Placing rod and anchor		.....
	Placing guy		.....
	Field supervision (15% on above)		.....
	Total unit cost of anchor in place		.....

Fig. 17. Sample Form for Building Up Anchor Unit Costs

In both Figs. 16 and 17 it will be noted that first column provides for the notation of the quantities (numbers of items); the second column provides for a description of the various items. The third column, entitled "Item Costs," is for the notation of the various individual prices of the elements component to the completed unit cost—be it cross arm, anchor or what not. Obviously, the figures in the last column are obtained by multiplying the quantities as given in the first column by the prices in the third column. The material costs, as given in the fourth column, are totaled under the caption "Total Material."

Next an allowance for waste (breakage) and loss is included at 2% and thus the material (including waste and loss) is obtained.

In connection with the item of "waste and loss"—and in further amplification of what has already been said—the writer would like to call attention to the fact that the word "waste," in this case, is a misnomer. Notwithstanding the fact that the word is commonly used in public utility cases — in connection with the derivation of unit costs—it is misleading, and inadvisable from a tactical standpoint. What we really mean by "waste" is "breakage"—and excess material resultant from splices, etc. (such as odd ends of cable and wire).

After the total material costs have been obtained, the results of the five-year analysis of labor costs (made in the manner hereinbefore described) are added. In the case of the illustration cited in Fig. 16—the labor item involves the cost of placing the cross arm on the pole. In the illustration cited in Fig. 17 the labor item

Light Anchor (Rural)	Item Costs	Total Costs
1 ½" x 6' anchor rod	.....	.....
1 2¼" sq. washer	.....	.....
1 5" anchor log	.....	.....
16 6d. nails	.....	.....
2 Guy hooks	.....	.....
1 Crosby clip	.....	.....
1 3 bolt clamp	.....	.....
8 Pole shims	.....	.....
1 ⅜" thimble	.....	.....
2 Fetter drive screws ½" x 4"	.....	.....
40' ⅜" S&M strand	.....	.....
Total	.....	.....
Plus 2% waste and loss		.....
Plus 6% supply expense		
Total material		.....
Labor placing rod	.....	
Labor placing guy	.....	
Supervision & Teaming	.....	
Total labor		.....
Unit cost		.....

Fig. 18. Another Method of Building Up Unit Costs

may be divided into two component elements—the cost of placing the rod and anchor—and the cost of placing the guy.

After the total labor cost has been determined an allowance of 15% is added for field supervision. This, as previously stated, covers the wages and expenses of the field foreman, who directs and, sometimes, actually participates in the work in question.

The question of supply expense (warehouse and purchasing expense and cost of handling supplies) has been previously discussed and will be amplified in a subsequent chapter. In the case of companies where definite records as to the relation between supply expense and the total amounts of material handled is available, it is good practice to include an allowance for supply expense in the unit cost itself. For the purpose of showing how this supply expense enters into the evolution of the unit cost, another illustration is presented showing a slightly different method of building up anchor unit costs (see Fig. 18). In this illustration it will be noted that the supply expense is included at 6%. The illustration is taken from a recent actual appraisal—and an analysis of the company's records proved conclusively that a 6% supply expense allowance was justifiable.

Unit costs for building and tree guys, pole brackets—and all of the other items included in the pole accounts—are derived in a manner similar to that illustrated in Figs. 16 and 17.

An illustration of the method of deriving aerial wire costs is presented in Fig. 19. In this connection, it will be noted that supervision has been included at 16% instead of 15%. The illustration under discussion was taken from an actual rate case and it is probable that the conditions indigent to this case warranted the inclusion of a supervisory allowance higher than the usual allowance—15%.

Fig. 19. Illustration of Method of Evolving Copper Aerial Wire Unit Costs

City:	#10 B&S Bare Copper	#12 N. B. S. Bare Copper	#14 N. B. S. Bare Copper	#12 B&S Bare Copper
1 Mile Wire	.....	.....	.....	.....
48 Pony Insulators	.....	.....	.....	.....
48 Tie Wires	.....	.....	.....	.....
Sleeves	.....	.....	.....	.....
Total	.....	.....	.....	.....
Plus 2% Loss & Waste	.....	.....	.....	.....
Plus 6% Supply Expense	.....	.....	.....	.....
Total material	.....	.....	.....	.....
Stringing & Rting	.....	.....	.....	.....
Teaming	.....	.....	.....	.....
Trimming	.....	.....	.....	.....
Supervision 16%	.....	.....	.....	.....
Tool Expense 2%	.....	.....	.....	.....
Total labor	.....	.....	.....	.....
Unit cost	.....	.....	.....	.....
Rural & Toll:				
1 Mile Wire	.....	.....	.....	.....
32 Pony Insulators	.....	.....	.....	.....
32 Tie Wires	.....	.....	.....	.....
Sleeves	.....	.....	.....	.....
Total	.....	.....	.....	.....
Plus 2% Loss & Waste	.....	.....	.....	.....
Plus 6% Supply Expense	.....	.....	.....	.....
Total material	.....	.....	.....	.....
Stringing & Tying	.....	.....	.....	.....
Teaming	.....	.....	.....	.....
Supervision 16%	.....	.....	.....	.....
Tool Expense 2%	.....	.....	.....	.....
Total labor	.....	.....	.....	.....
Unit cost	.....	.....	.....	.....

In considering Fig. 19 it will also be noted that "Tool Expense" has been included at 2%. The same general remarks apply to the inclusion of this item as to the item of Supply Expense, which was discussed in a preceding paragraph. In other words, where the company's records are sufficiently clear to supply the necessary supporting data, it is a good plan to include Tool Expense directly in the unit costs. Otherwise, it should be included with the items of general and collateral cost. Tool Expense, it will be remembered (if we adhere strictly to the reproduction cost theory), includes the cost of all tools used in construction work and also the expense of maintaining these tools during the time that the plant is in process of construction. After the construction work is completed—if usable tools are left over—a fair value may be assigned to them and this value may be deducted from the total tool expense. As a rule, however, most of the tools used in telephone construction work are relatively short lived and in many cases individual items have to be duplicated before the construction work is completed.

Referring again to Fig. 19, it will be noted that the unit costs are derived on a "mile-wire" basis. In other words, the result of the computation gives a unit cost per mile of wire in place. It will also be noted that insulators, tie wires and sleeves are included as a part of the wire unit cost.

The labor items, in connection with aerial wire, include stringing the wire; teaming and whatever tree trimming may be necessary to clear the right of way.

In the February installment we will consider ways and means of evolving aerial and underground cable unit costs.

H. R. Van Deventer Appointed Radio Concern Executive

New York City.—H. R. Van Deventer, formerly of the Bureau of Patent Development of the Westinghouse organization, and prior to that, prominently identified with the telephone industry, has been appointed Vice President in charge of research, manufacturing, and patent development, by the Dubilier Condenser and Radio Corp.

Chicago, Ill.—Chicago leads the world in use of the telephone, this city having 20.9 telephones to every 100 persons in a city of 2,755,000. New York has five less per hundred than Chicago.

Phone Work "Way Back When"

Veteran Recalls Trials and Triumphs of Times When Telephone Business Was in Its Swaddling Clothes. Those Were the Glad Days for the Trouble Men—NOT!

By John M. Walshe

Twenty-five Years Ago

The telephone art was in a very different state twenty-five years ago. The telephones themselves were of course of the magneto type and used wet cells, or rather, one Leclanche cell. The complete instrument was divided into three parts, which were screwed to a backboard. On the top was the magneto, below it came the transmitter connected to it by the short spirals of wire we thought necessary. Below the transmitter was the battery box.

At that time no connections were considered correct without making the wire into a spiral. The outside wire was connected to the connecting block, which was called a window terminal, with a spiral and the inside wire, of course, had a spiral at the window terminal and the instrument.

When getting supplies at the stores, before requisition forms were in use, it was necessary to ask for what you wanted and put it in your pocket if not too large. Nothing was assembled, much less tested. The installer in those days walked to his job and many a time I have carried a wall switchboard on my back, balancing a desk telephone and coil of wire, while the wall telephone was over the other shoulder and six glass jars tied together, with their contents, in the other hand. My pockets were stuffed with screws, receivers, cords and tools, etc.

We seldom had trouble with defective parts. There was not much to go wrong with a Blake transmitter or double pole receiver. Many of the subscribers still had the single pole receiver.

In my locality all the lines had ground return, which made the overhearing very pronounced, but no one complained. They were as pleased as children with a new toy to be able to talk at all. There were metallic circuits in some places and the long-distance lines were all metallic. The metallic circuits were in the same state of introduction as machine switching is today. There were in use a small number of telephones which still had carbon pencil transmitters, the diaphragm being a piece of pine board about five inches by eight. These instruments had no magnetoes, but had a push button to call exchange, the battery being at the central office. They also had two rubber tubes to connect the reciver with the ears of the user. The electrical part of the receiver was completely enclosed by the case. As the transmission was poor it was an advantage to use both tubes, which, of course, occupied both hands.

"Reducing Obsolescence"

If it was at all possible obsolete apparatus was used for some other purpose when superseded by more modern apparatus. This is why the testing apparatus at this time had usually been in former times the switching apparatus. It was considered essential in every exchange to have a test room, through which all wires passed to the switchroom. The outside cables, which were insulated with vulcanized india rubber, were fanned out and connected directly to the test jack. These test jacks had formerly been switchboard jacks and consisted of one spring four inches long with a shorter one underneath. They were mounted in rows and a flat plug was used. Two such springs were necessary in the case of a metallic circuit. Oh yes, we had phantom circuits and ghosts, too. When there were metallic circuits between exchanges they were always phantomed and a ghost on the top, with a grounded order wire circuit on top again.

The most unusual circuit I remember was an order wire for a pay station phantomed onto two subscribers' grounded lines. Talking of pay stations, the cash box was screwed to the side of the telephone, the coin merely ran down a chute, striking a bell as it dropped into the box. The operator could not tell the difference if you put in a coin or only struck the cash box with a jack-knife or key on the outside.

Testing in the Early Days

The wire chief's equipment consisted of a wall telephone, attached to which was a cord with flat plug, the other side being grounded.

An old pattern telegraph instrument of the galvanometer type was mounted on the test board, which was connected to a pair of test springs like a subscribers' line. This was connected in various ways by means of double-ended cords, the tests seldom exceeded those for continuity, ground and short circuit. Twenty cells were the most ever used in testing and that only on long distance.

No records of what a line should test were kept. One book was kept, in which the chief operator would write the trouble and the test clerk his findings after test and nature of trouble found. The operators' batteries of those days were the same as are often used today in small installations, gravity, crowsfoot type. There was an earlier type of sal-ammoniac cell called an agglomerate battery, having the various portions of the positive electrode made of carbon rods wrapped round with burlap. Switchboard cords were easy to mend, being a spiral of brass wire braided over in two layers with a single tinsel conductor, which fastened under a screw with a large flat head in the plug.

There were a few underground cables, the largest size fifty pair; the wires insulated with cotton, the terminal was an iron box about three feet long and eight inches square, the terminals on each side projecting far enough to carry a saw-tooth strip bent over towards the iron to afford protection from lightning. Special men were employed to splice the cables, but they were not able to wipe joints; the plumbers had also to be employed. Aerial cables began to be used about this time and at first they were rubber insulated or what is today called circular loom cable in some localities. Lead covered paper cables were becoming more common, but only for underground. Later on, aerial cables with paper insulation and rubber envelope braided, were used and it was possible to pump dry air

at eight pounds per square inch through it to dry it out.

For many years the only protection of lines and instruments was from lightning and in the many exchange fires I have had experienced, none were from electric light. Saw-tooth arresters were considered adequate for all protection. In this connection I should state that the spirals mentioned in the first part of this review were supposed to resist lightning owing to the greater inductance of spirals. The ordinary man did not, of course, understand this.

Strikes, Even Then

There were strikes, too. The first I remember was when the operators struck for better pay and conditions. The service was carried on by the management and office staff. The president, the vice-president, the general manager, superintendent and even shareholders helped operate, but after three days the operators were given most of their demands and returned to work.

The current for ringing was provided by a large size magneto with three magnets. This magneto was driven by a belt and was located in a neighboring factory, where power was available. During the night, hand magnetoes were used and the current was lead through a tell-tale, consisting of an old pattern of line drop, which made all the clatter necessary and often much more. You could always tell when ringing on a grounded line.

FAMOUS LAST WORDS

"I guess that pole is safe and will hold me, all right."

"I wonder if it's loaded. I'll look down the barrel and see."

"Look at this wire hanging down into the street. I'll throw it to one side."

"I wonder how much electricity these wires carry. I'll touch one and find out."

"It's a lot of trouble to hook up my safety belt every time, so here goes."

"I wonder whether this rope will hold my weight."

"Which one of these is the third rail, anyway?"

"Listen! That's the interurban whistle. Step on the accelerator and we'll beat it across."

"I've never driven a car in traffic before. But they say it's perfectly simple."

—The Mouthpiece.

Showing center leg of derrick telescoped to a length which is safe to operate when raising poles under electric lights and trolley wires. By removing the derrick, passing winch line over sheave wheel, then around a cable wheel and back to the rear bar across the truck, cable reels can be loaded by the winch without the use of the skid boards.

BEST PHONE TRUCK?

White Truck in Pennsylvania Work Said to Be Ideally Fitted for Duties

Philadelphia, Pa.—What is said to be the most completely and efficiently equipped motor truck in telephone work has resulted from the combined efforts of engineers of the Bell Telephone Co. of Pennsylvania and experts attached to the staff of the White Co.

This truck is representative of the 24 new Whites that have been added to the Pennsylvania Bell's already large fleet of this make. One of the new trucks is illustrated herewith.

They are equipped with power-driven winches operated by the driver, and in addition to carrying material, tools and many hundreds of smaller items of telephone equipment parts, they are so constructed as actually to perform a great part of the work of telephone construction on pole lines.

The Bell Telephone Company is noted for its most exacting methods —the thoroughness with which it studies its work, and the efficient methods used throughout its entire system, and in view of its wide range of experience over the last number of years with motor trucks, it is complimentary to the dependable performance of White trucks that it continues year after year to place additional White trucks in its service.

White After Phone Volume

The various Bell Telephone companies are now operating White trucks in virtually every state in the union, and the constant growth and expansion to all corners of the country demands that they maintain a most complete transportation system. It is difficult to conceive of any work to which motor trucks have been adopted that exacts the high standing of efficiency from a motor vehicle, as does the telephone company's work.

The special requirements of the telephone company's work necessitates that the trucks in its service not only be used as a means of transportation, but as a machine to do a large part of the work.

They are equipped with derricks for resetting poles, moving pole lines, stringing wire and other work, with a great saving of time and labor.

White Ants Attack Untreated Poles In California

Los Angeles.—White ants are attacking untreated cedar poles in large numbers throughout the territory from San Diego to Santa Barbara, and from coast as far east as Redlands. In some locations as many as 50 per cent of the poles have been attacked and are in a weakened condition as the result of these pests. Careful investigation has been made of the poles which were treated by creosote by the open-tank method, and it now appears that none of these poles, even though they had been in place for 12 years, show signs of having been attacked. The presence of creosote in the butts of these poles evidently prevents the white ants from attacking the poles. Ants not only attack the poles, but the cross arms and even insulator pins.

Industry Grows Into New Homes

Many Companies Being Forced Into Larger Offices —Telephone Industry Scores with Buildings that Promote Schemes of Civic Beauty—Some Examples

Chicago, Ill.—A sizable share of the commercial building activities now prevailing may be credited to the telephone companies of the country.

For some years past telephone companies in all parts of the country have been cramped for room. Departments have been scattered in quarters distant from one another, so that the intimate contact necessary in smooth executive work was maintained only by ingenious and strained efforts.

But now the old order passeth and the telephone industry is being housed in structures that, in many cities, are the first substantial evidences of predetermined scheme of civic beautification.

They are imposing structures, no matter to what city or town they are being awarded. Outwardly, they are expressions of their owners' pride in their cities, and in their companies. Within their doors is a blending of the strictly utilitarian and the beautiful that is a business-like and cordial welcome to their visitor, as well as an inspiration for efficient work.

Los Angeles Gets a Prize

Los Angeles gets one of the prize beauties among the scores of telephone buildings now being erected. The new ten-story building houses the executive and administrative offices of the Southern California Telephone Co.

The street exterior of the building presents an imposing architectural treatment of modern commercial design. Glazed polychrome terra cotta has been used entirely up to the third floor level and old-gold faced brick between the third and tenth floors with terra cotta trim on the top floor. This treatment forms a change of texture and color. The belt courses are sufficiently heavy to tie the mass into a well balanced facade of perfect proportion.

The new building was designed for the purpose of bringing together under one roof the executive and departmental offices of the company, now occupying floor space in no less than ten commercial office structures. It occupies 15,000 square feet of ground with a frontage of 100 feet and a depth of 150 feet. The building is "U" shape in plan and designed ultimately to be twelve stories in height. The additional stories will be added when the growth of the service and organization demand. It is of reinforced concrete construction.

The first floor contains the Business office, Manager's office, Complaint and Mailing Departments and the Cashier's office. This last mentioned office is located at the end of the south corridor and has a separate counter, back of which is the space utilized by the Cashier and his staff. The second floor is devoted to the Sales organization, Stenographic Department and the Business Office private branch exchange.

The third floor is to be used by the Traffic Department. The Plant Department will occupy the fourth, sixth and seventh floors and a portion of the fifth. The executive offices of the Company will be located on the fifth floor. The eighth floor will house the administrative commercial offices, while the last two floors will be used for Accounting office quarters. The stairway has been extended to the roof, a portion of which will be devoted to recreational purposes.

This new building represents an investment of approximately $1,000,000, and was specially designed as a telephone administrative office building. It is believed to be one of the finest buildings devoted to this purpose in the West.

New Home of Southern California Company at Los Angeles

Chicago's New Office

Chicago's general office staff is to have more elbow room since the construction of a new thirteen-story building for the company has been started. Foundations and walls are capable of supporting five more stories should they be needed. The building will be of steel frame construction. The exterior will be of variegated gray brick with putty-colored terra cotta trim. There will be marble trim at the entrance. All the stairways will be of marble and the finishings throughout will be of select golden oak.

The new structure will front 101 feet on Washington street with a depth of 81 feet on Franklin street. The main entrance will be on Washington. There will be six shops on the ground floor.

When completed the project will represent an investment of $1,400,000. The telephone company, which will use the building for general offices, has signed a twenty-five year lease at a fixed annual rental of $87,500. The telephone company will pay the taxes, insurance and maintenance expenses.

Conneaut Claims the Best

Conneaut, Ohio, is throwing out its chest about the new central office building, which is said to be the finest telephone building that any

American city of Conneaut's size can claim. Local newspapers state, "the telephone building stands today a monument to the city and its builders, the most modern structure in Conneaut."

Gustav Hirsch, Consulting Engineer, Columbus, Ohio had charge of the extension and expansion plans of this company, including the building and equipment thereof.

M. Goebricher, Secretary and General Manager, carried through all of the local work necessary to the completion of the work of expansion. All of the stock necessary to be sold to take care of the financial program was over-subscribed and sold locally, at par. Plant and building changes cost $150,000.

The Central office equipment is Auto-manual, originally installed in 1913, converted and modernized in this cut-over.

The building was erected by Fred L. Horton, General Contractor, Conneaut, Ohio. Its equipment includes batteries and chloride accumulators from the Electric Storage Battery Co., Philadelphia, Pa., new toll board (North Automanual) and Cook main frame.

The building, throughout, is modern in every detail, concrete and steel construction, including steel windows and doors, equipped with wire metal glass.

Minnesota's Convention, St. Paul, January 23-25

St. Paul, Minn. — Minnesota's annual convention will be held at the Ryan Hotel, St. Paul, Jan. 23-25. Topics to be discussed feature construction, maintenance, traffic, advertising, collection, insurance, and radio.

Delaware, O., Company Pays 100 Straight Quarterly Dividends

Delaware, O. — January 1, 1923, the Citizens Telephone Co. paid its hundredth consecutive quarterly dividend.

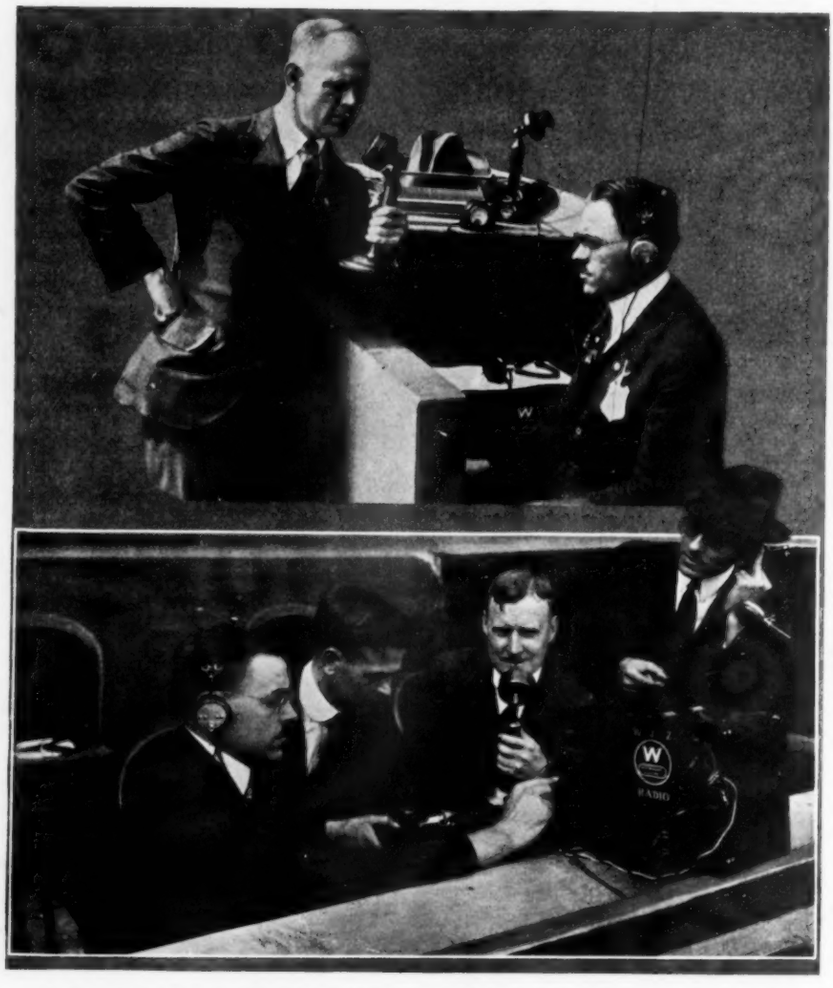
BACK ISSUES WANTED

Several copies of Jan. and Sept., 1922, issues of TELEPHONE ENGINEER are needed for files of telephone companies. We will extend subscriptions two months for each issue supplied us.

TELEPHONE ENGINEER
28 E. Jackson Blvd.
CHICAGO

Ohio public utilities had to invest more than $15 additional new capital for each resident of the state during the first ten months of 1922.

Radio History in the Making



A few months makes most radio achievements antique history, but one feat remains bright in the annals, the broadcasting of the world's baseball series at New York last autumn. The Westinghouse Press Bureau sends these pictures. Above—Grantland Rice, New York Tribune sporting writer, who was the announcer. Below—Experts responsible for the technical details of the world's greatest broadcasting feat: Moseley of the Western Union, and H. E. Hiller, John Frazier and C. W. Horn, the latter three of the Westinghouse organization.

W. J. Lord, Pacific T. and T. Man, Named as "City Dad"

Grass Valley, Cal.—William J. Lord, resident manager for the Pacific T. and T. Co., has been made a member of the City Council.

Texas Annual Meeting, Dallas, March 20-23

Dallas, Tex.—The Annual convention of the Texas Independent Telephone Assn. will be held at Hotel Adolphus here, March 20-23.

Chattanooga, Tenn.—A half million dollars is to be spent here by the Cumberland Telephone Co. in an effort to catch up with the demand for service.

Strategy in Beautiful Mansfield Poster

Mansfield, O.—An attractive poster is being distributed by the Mansfield Telephone Co. It shows a beautiful blonde operator and bears the caption, "The human equation in the telephone conversation." Many is the man who will show more consideration for the operator when he looks at the Mansfield picture and thinks that he may be speaking to its model.

Bell Promotes Farmers' Mutual Company at Seneca, Ill.

Seneca, Ill.—Farmer subscribers are to be responsible for line maintenance, while the Bell company is to handle exchange matters, in an arrangement to be given a trial here. Fred H. Whittaker, local Bell representative, is explaining the plan to the farmers.

Shock of Dr. Bell's Death Is Fatal to His Widow

Washington, D. C. — Mrs. Mabel Hubbard Bell, widow of the inventor of the telephone, died at her daughter's home at Chevy Chase, Jan 3. Mrs. Bell never recovered from the shock of her husband's death last August.

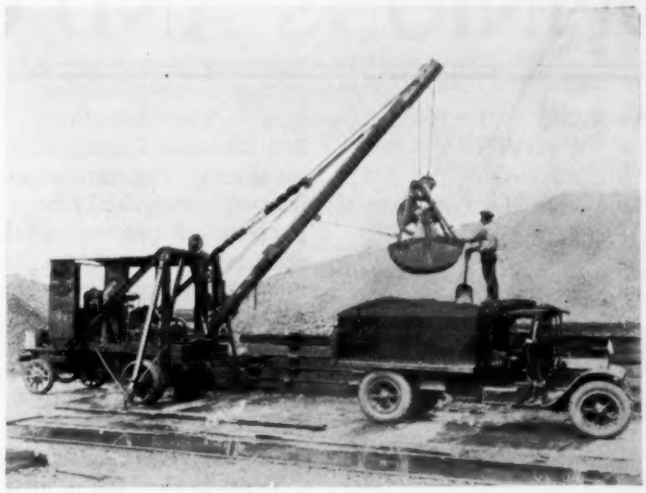
Mrs. Bell was born in Cambridge, Mass. At the age of three she suffered from scarlet fever, which left her deaf. She met Dr. Bell at his school for voice culture, which she attended because of her affliction. The desire to make her hear is said to have been Bell's inspiration in the invention of the telephone. Mrs. Bell's father financed Bell and was first president of the Bell company.

Mountain Home (N. Y.) Name Now Is Northern N. Y. Tel. Corp.

Plattsburg, N. Y.—The Northern New York Telephone Corp. is the name by which the Mountain Home Telephone Co. is known since Jan. 1. The new name, which is the only change made the first of the year, was chosen because it defined the company's territory more clearly.

Alfred Bratt, Nebraska Independent Leader, Dies

Genoa, Neb.—Alfred Bratt, president of the Monroe Telephone Co., one of the large independent properties of Nebraska, died recently after a prelonged illness. He was one of the leading business men of his section of the state. His son, H. C. Bratt, succeeds him in the management of the Monroe Telephone enterprise.



Byers Truckrane on the Job

Roadster in New York Telephone Service Passes 100,000 Miles

New York City.—"Practically a new car as you can see by its speedometer," says John Drummond, driver of one of the New York Telephone Co. roadsters which has passed its 100,000 mark in service and now registers on its speedmoter 04000. The car has been driven almost continuously since April 1916.

South Bend, Ind.—The Indiana Bell plans to spend $465,000 in South Bend during 1923 to meeting the growing telephone demands of this city.

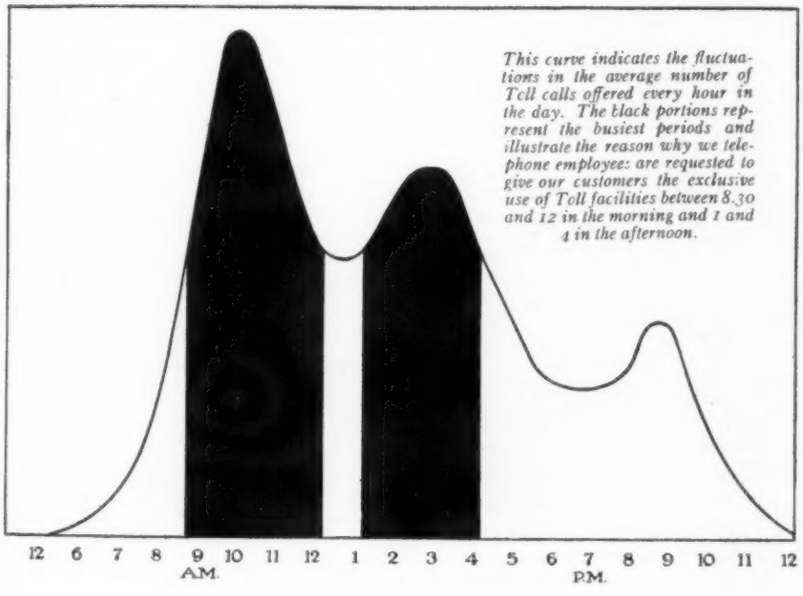
Cape Town, South Africa. — Post Office authorities are conducting trials to determine utility of radio telephony between remote communities.

Crane on Motor Truck Helps In Construction Work.

Ravenna, O.—The Byers Machine Co. has developed a crane that can be mounted permanently on a motor truck. The new outfit, called the "Byers Truckrane," can be driven from the garage to the job every morning, or driven from one job to another with a minimum of time lost in travel. Its increased "movability" together with the strength and comparative lightness of the unit, extend the field of crane service. The crane, unmounted, weighs only six tons. It has a power drum for raising and lowering the boom which is of steel. The crane is furnished with a Hercules four cylinder 4" x5" engine developping over 30 H. P., to be operated with gasoline power. Any half cubic yard bucket weighing not over 2000 lbs. can be used with it. It is not at all necessary to use a new truck for the mounting.

David City, Neb.—An interesting folder, describing the work of the Easy pipe pusher, has been issued by the Easy Mfg. Co. Illustrations show how the Easy pipe pusher works in pushing pipe and conduit underground, for a considerable distance, without disturbing the surface of the ground.

Dallas, Tex.—A canvass of more than 60 officials of the Southwestern Bell Telephone Co., who attended a two day conference held here recently, showed that the average time each man had been in the Southwestern's service was eighteen years and four months.


This curve indicates the fluctuations in the average number of Toll calls offered every hour in the day. The black portions represent the busiest periods and illustrate the reason why we telephone employees are requested to give our customers the exclusive use of Toll facilities between 8.30 and 12 in the morning and 1 and 4 in the afternoon.
12 6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11 12
A.M.
P.M.

OPINIONS AND COMMENTS

MANAGERS WE HAVE KNOWN

The One Who Is Too Busy

A telephone manager was once heard to make a statement that he was too busy to take part in any of the activities of the Commercial Club and other similar bodies in his city. He belonged to some of them but was too busy to do anything except to pay his annual dues.

This particular manager probably did not think at the time he made this statement, that it was equivalent to saying that he was too busy to manage properly the business that is entrusted to his care. Yet, to all intents and purposes, this is what his statement meant.

He would probably be very indignant if anyone suggested that he is not giving his very best efforts in the interests of his company. He could undoubtedly point to many extra hours of labor put in after the regular hours of the business day were done and to many personal pleasures that were sacrificed for the benefit of the property for which he is responsible.

In spite of this all, however, there is one very important matter in which he is neglecting to give his company the service to which it is entitled. In performing a mass of detail work he has overlooked one of the big things in the job of management.

It is almost a truism that a man works best when he is working under a load. A busy man always has time to do one thing more if the thing itself is worth doing. No telephone manager should be so busy that he cannot do something for the general good of the community that his company serves.

The welfare of any business is associated inseparably with the welfare of the community in which it is located and each business should do its part in promoting the community welfare. The telephone business like all other businesses, must do its share. The various civic bodies are organized for the sole purpose of promoting this general welfare and no telephone manager should be so busy that he cannot take an active part in their work. It is a duty that he owes to himself, to his company and to his community.

"THE SAME TO YOU"

With a pleasant glow that will last long after the holidays are over, even after the Christmas bills are paid, TELEPHONE ENGINEER acknowledges the holiday greetings sent it.

To all of you, individuals and companies, we wish a New Year that will be all that you could wish it yourselves.

Exchange your 1918 War Savings Stamps for 4% Treasury Savings Certificates at your Bank or Postoffice now.

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"THE CHRONIC KICKER"

Practically every telephone exchange has one or more subscriber who is labeled as a "chronic kicker". The traffic or maintenance forces count a week lost in which they do not receive a complaint concerning service or trouble from this chronically dissatisfied subscriber. Too often the complaint is recorded, a perfunctory test made and if nothing serious is found the matter is dismissed as another exhibition of the unreasonableness or ill-will of the subscriber.

We know of one case where this procedure was not followed and strangely enough the dissatisfied subscriber was converted into a friend of the telephone company. It happened that the report was assigned to a new repairman and through some failure of the system of underground information in the office he was not advised that the subscriber had been listed as belonging to the disgruntled class. He went on the case expecting to find trouble and after a thorough inspection located an intermittent case of trouble that had been the source of much poor service.

The experience in this as well as other cases has convinced us that there is little excuse for any exchange having a chronically dissatisfied subscriber. When a complaint is made, the subscriber has or thinks he has a real reason for making it. A careful study of the case will usually disclose that reason. It may be an actual case of trouble as in the case we have cited or it may be a fancied grievance due to some misunderstanding of the use and limitations of the service. If his case is handled with tact and if he can be convinced that the company is honestly endeavoring to give him the service to which he is entitled, he can be converted into that greatest of assets of any business, a satisfied patron.

A LOOK BACKWARD AND A LOOK AHEAD

January is, or should be, a month for comparisons in the telephone industry. December 31st marks the closing of the books on another year's business and the inevitable comparisons are made between the financial results of the year just closed and the preceding years. This is the comparison that is usually first in the minds of the executives and directors of the various companies. It is the measure of the progress of the company from the standpoint of the stockholder. There are other comparisons that deserve to be made as well as those of net earnings and return on the investment.

In the plant department there is a lull in activity during January unless the sleet demon gets in his work. The plant records of almost any company are a mine of valuable data if time can be spent in studying, arranging and classifying them. Taking the construction gang reports, for instance: How much could be learned about the efficiencies of foremen, workmen and construction methods if the reports are analyzed and the data reduced to work units per man-hour. Or again, in maintenance work, what valuable comparisons might be made between divisions, districts and exchanges if the records are analyzed and cost per case of trouble, cases per station per day, average time to clear a case, etc., were determined?

In the traffic department, there is likewise a perceptible decrease in the volume of traffic after the rush of the Christmas holidays. Perhaps the spare time of clerks and assistants might be available for a study of traffic results. Some of the valuable figures for comparison are work units per operator-hour, cost of handling traffic per thousand calls, traffic complaints per station per year, operating and subscriber errors per thousand calls and many others that might be suggested. Data of these kinds will be an invaluable aid, not only for comparison of the results of the past, but also in providing marks to be striven for in the future.

In the commercial department there are also opportunities for comparison. A survey might be made to determine the standing of the company with the public. Has the public good will increased or decreased during the past year? Have contract orders been completed as expeditiously as possible? How does the company stand in the matter of collections? Which classes of service have been developed during the year and which have lagged? All of these matters and others that would come to mind if a little thought were given have a direct bearing on the success of the company.

There is no better time to make surveys such as have been suggested than in the first month of the year. Then the results of the past year are available and plans for the present year are in the making. With such data as these to show in what places and in what respects improvements can be made, future activities can be mapped out and progress can be made, not in a hit-or-miss, go-as-you-please fashion but with a definite goal set for attainment.

A MONOPOLY OF RADIO BROADCASTING

One of our contemporaries, a paper devoted to the interests of the dealer in radio apparatus and supplies, recently printed an article in which the author expressed fear that the "Telephone Trust" (whoever that may be) may monopolize the radio broadcasting field by installing a chain of high powered stations at various points in the country. He seems to fear that it would offer programs of such a quality that listeners would demand the closing of all other stations.

We have seen no indications that any interest in the telephone field desires to monopolize the radio broadcasting of the country but we have this to say that, if it did we would be spared much of the difficulty and confusion that exists under the present arrangement.

Up to the present time, the sole example of a radio broadcasting installation operated on any kind of a sane, reasonable commercial basis is that of the station of the A. T. & T. Co. in New York. All others are operated on more or less of an advertising basis and many of the owners are finding it a rather expensive form of advertising.

Unless we are wrong in our estimate of affairs, many of the stations now in operation will sooner or later find the burden too heavy and will close down. heWn this happens the dealer in radio apparatus will wish thtt the transmitting end of the radio field had been organized on a business basis rather than on its present unsound foundation. May we be pardoned for suggesting that the telephone interests are the only ones in this country that have indicated the ability or desire to so organize it.

TAX EXEMPT SECURITIES

The proposal by President Harding in his message to Congress for an amendment to the Constitution which will permit restriction of the issue of tax exempt securities, is of interest to one of the largest classes of tax payers, the public utilities. They are interested not only because they must draw funds for improvements and extensions from the same sources that furnish funds to purchase the tax exempt securities.

The difficulty of the tax exempt security is that it does not benefit the small investor but offers an opportunity for persons of wealth to avoid payment of taxes that they could well afford. Funds are placed in these securities that could be used for the development of utilities and industries and at the same time equalize the distribution of the tax burden.

The President's suggestion indicates that the necessity of a change in this matter is becoming better understood and the matter should be kept before the public until some relief is granted even if an amendment to the Federal Constitution is necessary.

The Fleetwood Automatic Telephone Exchange. The Electrical Review, London.

A large number of exchanges of the "Relay" automatic type have been installed for private service but the first one installed for public service in England is the exchange at Fleetwood, which was opened for service in July. In this exchange the subscribers are provided with the standard form of dial and are connected to the exchange by a two-wire line without earth connection. In making a local call the receiver is removed from the hook and if the dialing tone is heard, the dial is operated the requisite number of times. The connection at the central office is made entirely by relays and is metered against the calling subscriber when he replaces the receiver on the hook. If the called subscriber does not answer or if certain special numbers are called, the call is not metered. A special alarm is provided to give a warning signal if the meter does not operate correctly.

In the Fleetwood exchange, no manual board is provided locally and calls for other exchanges and for information are trunked to the Blackpool central office nine miles away. Incoming calls for Fleetwood are dialed directly by the Blackpool operator. The operators at Cleveleys, another exchange in the same area also dial Fleetwood calls direct.

The relays used are modified somewhat from the usual telephone design. The brass pin used to prevent sticking of the armature to the core is replaced by a larger strip of metal and micanite and empire cloth insulation is used in place of fibre and ebonite. The contact pressure is not less than 1¼ oz. per contact and a special bronze spring material is used. Relay trouble is reduced to a minimum by these special features.

The exchange is planned for an ultimate of 920 lines and 480 are at present installed. Forty incoming and 40 outgoing trunks are provided. The floor space occupied is 875 sq. ft., 330 sq. ft. of which are occupied by the power plant, test desk and batteries. The present installation requires 12,568 relays, an average of 26 per subscriber line. When the full 920 lines are in use, 22,025 relays will be required. Both three and four digit numbers are used, the lines being numbered from 200 to 799 and from 8000 to 8319. Naught is used for trunk calls and 9 for information. One is not used, due to the liability of the subscriber sending a false impulse when the receiver is removed from the switchhook.

FOREIGN INDUSTRY

Two of the Features of European Telephony

Das Rheinland Kabel. Das erste deutsche Ueberland - Fernsprechkabel fertiggestellt. Published by the Postal Administration, Berlin, Germany.

A subscriber of TELEPHONE ENGINEER in Berlin, Germany, has recently sent us a beautifully printed and illustrated pamphlet describing the construction of the long distance cable extending from Berlin to the Rhenish-Westphalian industrial district. The contents of the pamphlet comprise a series of four articles dealing with various features of the engineering, manufacture and installation of the cable.

The first article by P. Craemer tells the story of the planning and general features of the installation of the cable. In 1909 a severe storm cut off communication between Berlin and other parts of Germany especially with the industrial centers on the Rhine and in Westphalia. Following this it was decided to construct an underground cable which was later named the Rhineland cable. The route selected led from Berlin to Hanover and thence to Dortmund. From Dortmund two branches extend to Dusseldorf and Cologne. The length between terminals is over 600 km. (360 miles). The cable is placed in 4 duct cement conduit with manholes spaced from 170 to 200 meters apart. The Berlin-Hanover section was completed in 1914 after which the work was delayed until 1920. The Hanover-Dortmund section was placed in service in October, 1921, and the branches to Dusseldorf and Cologne were completed in November.

In the second article, Dr. F. Breisig discusses the fundamental theoretical considerations of the long distance cable. After describing the fundamental process of speech transmission he shows that the factor which establishes the limit is not the pure resistance but the capacity between the conductors. The use of inductance in the form of coils installed according to the method of Pupin improves the quality of the speech transmitted. Since the cable is to be used for superposed circuits, the phantom as well as the physical circuits must be loaded and careful balancing of the capacity of the conductors is necessary. Since the cable was planned before a successful telephone repeater was developed it was necessary to use conductors of 3mm. diameter (approximately No. 8 B.&S. ga.). In the later cables conductors of 1.4 and .9 millimeters (approximately No. 16 and No. 19 B. & S. respectively) are used. The heavier conductors are carried through to the end of the Rhineland cable and permit service without the use of repeaters. They will ultimately prove useful for still greater distances.

The manufacture of the cable and the Pupin coils is described in the third article by Dr. A. Ebeling, Director of the Siemens and Halske A. G. in whose works the greater portion of the cable and all of the coils were made. The construction of the coils and the special condensers for balancing the capacity of the conductors is described. The formation of the cable itself is also given. The Berlin Hanover section is made up of 14 quads of 2mm. conductors and 12 quads of 3mm. conductors giving a total of 78 circuits including the phantoms. The Hanover-Dortmund section is made up of 7 pairs of 1.5mm. conductors, 12 quads and 10 pairs of 2mm. conductor and 15 quads of 3mm. conductors, making a total of 91 circuits for telephone and 7 pairs for telegraph. 1 pair of the 1.5mm., 4 pairs of the 2mm. and 3 quads of the 3mm. conductors are of aluminum while the others are copper. In the sections from Dortmund to Dusseldorf and Cologne, in addition to the 7 pairs of 1.5mm. conductors for telegraph are 7 quads of 3mm. conductors, 7 quads of 2mm. conductors and 14 quads arranged for construction reasons in 7 eight conductor groups, of 1.4mm. conductors. Outside these is a layer of 41 quads of .9mm. conductors making a total of 207 telephone circuits. All conductors are copper. The exactness with which the actual cable compared to the theoretical was shown when no difference in loudness and quality of speech was recognizable between an artificial standard constructed to represent the cable and a circuit equivalent to the entire 600mm. cable obtained by looping back pairs in a section of the cable after it was installed.

The final article by R. Diebel describes organization of the department that performs the actual construction work. On account of the great weight of the cable reels and the loading coil cases extensive use of machinery was made. Details of the splicing and testing are also given.

The Ontario Telephone Act

Special Legislation Is Provided by Canadian Province to Encourage Development of Telephone Service in Communities Where Commercial Success Is Doubtful

By Francis Dagger

Supervisor of Telephone Systems, The Ontario Railway and Municipal Board

Twenty years ago the telephone was practically unknown among the farming communities of Ontario, if not of Canada, this condition being, no doubt, due to the fact that the rural field did not offer the existing companies as favorable returns upon the required investment as the urban districts, which were at that period, and even at the present time are furnishing a continuous demand for more telephones. Moreover the farmer had not yet been educated to appreciate the advantages which would accrue to him, both socially and financially, by the acquisition of this almost indispensable utility. From the best records available it would appear that in 1904 there were not more than 1,500 rural telephones in Ontario.

Up to 1900 there were not more than 10-Farmer Telephone Systems in existence, and by the end of 1904 these had grown to 33, the two largest having 190 and 57 subscribers respectively. In 1905 the publicity given to the proceedings of The Select Committee on Telephone Systems at Ottawa and the consequent activity on the part of manufacturers of equipment looking for business, resulted in the awakening of the farmers to the value of rural telephone service in all parts of the Province. There is now a total of 663 systems furnishing service to 100,000 farmers.

These systems are widely diversified in regard to their manner of organization, type of equipment and cost of service and may be divided into four classes, as follows:

1. Systems operated by individuals or partners.

2. Systems operated by dividend paying companies.

3. Systems operated in the co-operative plan.

4. Systems operated under Part II of "Ontario Telephone Act 1918."

Systems under classes one and two are operated as ordinary commercial enterprises, the charges being fixed at a rate sufficient to cover the cost of operation, maintenance, provide for depreciation and return a reasonable interest on the investment. The annual charges vary from $10 to $25, the actual amount being governed by a number of conditions, viz.:

(a) Cost of switchboard operation.

(b) Type of construction.

(c) Number of stations per mile of circuit.

(d) Number of stations on each circuit.

(e) Whether subscriber purchases his telephone.

(f) Whether subscriber contributes any material or labor.

(g) Whether subscriber renews his own batteries.

The general charges prevailing in classes 1 and 2, where these systems furnish all the equipment, provide metallic circuits and give continuous service, range from $15.00 to $18.00 per annum. Where a higher rate is charged it is usually in sparsely settled districts where few subscribers per mile of pole lead are obtainable or where, owing to difficulties of construction, the cost of installation is higher, as for instance, in the Muskoka, Parry Sound, Nipissing and Thunder Bay districts. Higher rates also prevail where rural lines terminate at and have the advantage of local service in large "Bell" centers such as Ottawa, London, Windsor, etc.

Systems under class 3 are Companies or Associations in which the subscribers furnish the capital but do not receive dividends. Each subscriber pays his share of the cost of establishing the system, which in pre-war times range from $35.00 to $75.00. Subscribers are then assessed with the actual cost of maintenance and switching, each year. This cost varies from $3.00 to $10.00 per telephone. The minimum charge is made possible by the fact that the subscribers, being mutually interested in keeping down the cost of maintenance, contribute the necessary labor for repairs without cost to the system, and renew the batteries at their own expense. The executive expenses of these systems is insignificant as the only official receiving remuneration is the Secretary, who is paid only a nominal sum and in some cases his services are voluntary. The cost of these systems in many cases is considerably reduced by the fact that the subscribers contribute much free labor and in some instances furnish the poles. It is obvious, however, that if there were added to the annual charges paid by these subscribers, the value of their gratuitous labor on repairs the expense of battery renewals, depreciation, and interest on the investment, the cost of this so-called "co-operative" service would be at least the equivalent of the rates charged by Companies operating upon sound commercial principles.

In my opinion, while this class of system served its purpose in the earlier days as educating the farmer to the value of rural telephone service, they have outlived their usefulness for the reason that the methods adopted in their operation do not produce satisfactory service. With a view to remedying these conditions legislation was enacted requiring all these systems to become incorporated under "The Ontario Companies Act" and many of them have been reorganized within the last two or three years. Pressure is being gradually brought to bear upon those systems which are still unincorporated, and it is anticipated that better conditions will prevail in the future. The situation, however, is one which requires careful handling as many members of these mutual Associations resent any interference with their right to handle their affairs in their own way.

An effort is also being made to reduce the number of small systems by consolidating them wherever their lines terminate at the same point, thereby making it possible to operate under uniform conditions and with greater efficiency. For instance, there are many towns and villages which form the centre of a number of separate systems comprising from 10 to 20 subscribers, each of whom assumes responsibility for the maintenance of his service. It is unnecessary for me to say how much more efficient the service would be if at each of the 30 places these systems were operated as one Company under an executive responsible for their construction and maintenance. An effort is being made to bring about this result, and in a number of cases it has met with success. The chief deterrent is a fear on the part of the subscribers that re-

organization will increase the cost of service, but as the demand for greater efficiency increases this difficulty will be removed.

Up to 1910 the telephone sysems in Ontario were not subject to any legislative control, they just grew "like Topsy," with no one to interfere with them, once they were granted by their Township Councils, the right to use the highways. In some cases they even built their lines without any such permission, and no one bothered them. The result being that there was no attempt to co-ordinate these systems with each other, or with the Bell Telephone Co. The tendency up to that time had been to compete rather than co-operate. Parallel lines were built on many highways, duplicate systems were constructed in some towns and villages, and the general idea prevailed, as it also did at that time in the United States, that the telephone problem would be solved by competition. Experience has, however, proved that this theory does not work out in practice.

With the object of improving the then existing conditions, I suggested to the Hon. I. B. Lucas, a Minister in the "Whitney" Government, the desirability of placing the telephone systems of the Province under the jurisdiction of the Ontario Railway & Municipal Board, the result being that by his direction I drafted "The Ontario Telephone Act 1910" it being enacted by the legislature in that year. This Act was afterwards consolidated with "The Local Municipal Telephone Act 1908" (which is now Part II of "The Ontario Telephone Act 1918") and has been amended from time to time until it now comprises 125 sections as compared with 30 sections in the two original Acts.

In its present form the Act is divided into six parts, as follows:

Part I Telephone Systems operated as a public utility.
Part II Local Municipal Telephone Systems.
Part III Grants of Municipal franchises.
Part IV Incorporation of Companies.
Part V All Telephone Systems.
Part VI Powers of the Board.

To take these in their reverse order, Part VI vests the Board with the duty of superintending the carrying out of the Act, and for that purpose gives it all necessary powers and authority over and in respect of any person, company or municipality owning or operating a telephone system or line. Its duties include:

1. The hearing and deciding of applications or complaints in regard to any matter within the scope of the Act, including the revision of charges, complaints as to service, paralleling of lines, neglect to interchange service, etc.
2. The approval of charges, agreements for interchange of service, transfer of ownership, municipal franchises, debenture by-laws, etc.
3. The fixing of terms for, the furnishing of service where the parties cannot agree, for interchange of service, for the joint use of pole leads, and of the price to be paid by municipalities proposing to establish systems, for any existing plant within any such municipality.
4. The fixing of specifications for the construction and maintenance of telephone lines.
5. The granting of the right to use the highways in unorganized territory, and to parallel existing pole leads wherever desirable in the public interest.

I may say here that while the functions of the Board are to control and regulate, its policy has always been to assist rather than retard the systems under its jurisdiction in the development and operation of telephone service. The Board and its officers are always ready to furnish advice and assistance to any person or municipality interested in the establishment of telephone service, and much good work is done along this line. Existing systems are encouraged to submit their problems to the Board at all times, and in this way many difficulties are cleared away without the necessity of formal hearings. While it is not possible for its decisions to always satisfy both parties, I am convinced that the Board enjoys the confidence of the vast majority of those operating telephone system and their subscribers throughout the Province, and even if they had the opportunity, no one would entertain the thought of reverting to the old order of things before the Act came into existence.

Part V applies to all telephone systems and provides:

1. That every system shall furnish a prompt and efficient service, the Board having authority, with that object in view to prescribe specifications as to construction and maintenance.

2. That systems may if necessary for the efficiency of the service repair any equipment owned by a subscriber at his cost;

3. Paralleling of pole leads is prohibited unless by consent of the Board, and any Order of the Board to prevent unnecessary duplication of lines is final;

4. Service applied for must be furnished upon terms agreed upon by applicant and the system, or as prescribed by the Board;

5. Board may give system right to construct in any town, village or township if for purpose of carrying out any order it may make;

6. Interchange of service may be ordered on terms and conditions prescribed by the Board where parties fail to agree;

7. The sale or transfer of any system must be approved by the Board;

8. All charges must be approved by the Board;

9. A company may be ordered to maintain a depreciation fund, and the moneys belonging to such fund cannot be used for any other purpose than reconstruction, except by consent of the Board;

10. Stock or bond issues or loans extending beyond twelve months must be approved by the Board;

11. The interference with or use of equipment so as to prevent the proper transmission of conversations over any circuit, the divulging by operators or other persons of the purport of conversations overheard, and the use of profane, indecent or grossly insulting language over any telephone line are prohibited and subject to penalties of $25, or thirty days imprisonment for each offense;

12. Officials refusing or neglecting to furnish the Board upon request with reports or returns are liable to a penalty of $50 a day;

13. Systems receiving daily weather reports must, upon request, furnish subscribers with same without charge.

The following is a brief summary of the minimum specifications prescribed by the Board under the authority of this Part:

Specifications

1. All lines must be metallic circuits;
2. One circuit—20 ft. poles with 5″ tops.
   Two to three circuits—25 ft. poles with 5″ tops, 6 pin crossarms.
   Four to five circuits—25 ft. poles, 6″ tops, 10 pin crossarms.
   Two or more crossarms—25 ft. poles, 7″ tops.
3. Clearance of 20 ft. over highways, 18 ft. over private driveways. Standard railway crossings to be 25 feet above top of rail and must otherwise conform with requirements of The Board of Railway Commissioners for Canada.
4. Line wire No. 12 B. B. or E. B. B. Galvanized Iron.
5. Poles 32 per mile up to five circuits, over that 34 per mile.
6. 3 ft. clearance from other wires carrying less than 350 volts. 5 ft.

clearance from circuits carrying less than 10,000 volts. 10 ft. clearance from circuits carrying over 10,000 volts.

7. Lightning rod of No. 9 G. I. wire on every tenth pole.
8. Depth of poles in ground: For 20 ft. poles—4 ft., 25 ft.—5 ft., 30 ft. —5½ ft., 35 or 40 ft.—6 ft.
9. Brackets on poles 18" apart.
10. Crossarms not less than 3"x4", placed 10" from top of pole and 18" apart. Pins to be 12" centres, with 17" centres for pole space.
11. Patents anchors may be used except on heavy leads, in which case log anchors are required.
12. Side braces to be used where guying is not possible. Braces to be poles not less than 15 ft. in length, set in ground not less than 6 ft. from butt of pole.
13. Road crossings to be at angle of 45 degrees, sufficiently reinforced by guys or braces.
14. Guy wires to be not less than two No. 9 wires twisted, for bracket leads. For single crossarms leads —No. 16 crucible steel wire. For heavier leads—No. 13 crucible steel wire.
15. Leading-in-wires shall be No. 16 B. and S. or "Ironite" or No. 17 steel copper clad, in twisted pairs, carried to a standard lightning protector inside the building where the wires enter.
16. Ground wires to be No. 16 copper insulated.
    Ground rods to be 6 ft. x ⅝".
17. Bridging telephones of standard make with ringer coils of not less than 1600 Ohms resistance.
18. Maximum load on one circuit 15 stations.
    Telephone on same circuit to have ringers of equal resistance.

Part IV provides:

1. That every system owned by five or more persons shall become incorporated as a company with share capital under "The Ontario Companies Act;"

2. Each member or partner in any system shall upon incorporation be allotted shares to the value of his interest in the system, such interest to include cash, material or labor contributed by him;

3. In the event of dispute as to the value of any member or partner's interest the same shall be decided by the Board.

Part III deals with the granting of the right to use the highways and provides:

1. In cities and towns the grant must be consented to by vote of the electors, in other municipalities with the approval of the Board;

2. In cities, towns and villages the grant may be exclusive for a period not exceeding five years;

3. Disagreements as to the terms and conditions of any grant may by mutual consent be referred to the Board for settlement;

4. In unorganized territory the Board may grant the right.

Part II provides machinery whereby any number of landowners in a municipality in excess of ten many organize a telephone system, the money necessary for the establishment or extension of such system being provided by the issue of municipal debentures repayable in ten or more annual instalments of principal and interest, which instalments are a charge against the property of the subscribers. Those ratepayers who are are not subscribers have no obligations in respect of these systems, and their properties cannot be assessed for telephone purposes.

These systems are vested in the municipality in trust for the benefit of the subscribers, and may be managed by the municipal council or a board of three commissoner, whichever the subscribers may decide. Management by commissioners prevails generally among those systems already established under this Part, their organization being analogous to that of an incorporated company, the commissioners having the same functions as directors, being elected annually by the subscribers who, with the exception of having no investment, and therefore receiving no dividends, in all other respects enjoy the same rights and privileges as shareholders. The more important provisions of this Part are, as follows:

1. Upon the petition of not less than ten assessed landowners the municipal council may pass a by-law providing for the establishment of a telephone system, and authorizing the Mayor or Reeve to borrow the necessary money to carry out the work, all sums so borrowed to be repaid out of the proceeds of the sale of debentures to be issued under a by-law to be passed within two years from the date of the establishment by-law;

2. The petition is a binding contract on the part of each petitioner to pay in equal shares the cost of establishing and maintaining the proposed system by an annual special rate to be levied upon his property for ten years. No name may be removed from the petition without the consent of the Board;

3. The system may be extended into any adjacent municipality with the consent of the council of such municipality, or with the approval of the Board upon petition of 10 assessed landowners in such municipality;

4. The system may be extended into an unorganized township with the approval of the Board;

5. The by-laws for the establishment of the system must be approved by the Board;

6. The debenture by-law does not require the assent of the electors, but it is not valid until approved by the Board.

7. Where it is necessary to reconstruct, replace or alter a system or any part thereof, the Board may authorize the municipal council to pass the necessary by-law and issue debentures to pay for the work;

8. If it is proposed to establish a system upon highways along which the poles and wires of a company are already erected, the municipality must offer to purchase such system at a fixed price. If the company does not accept the price so offered the Board may determine the price to be offered, and if such price is not accepted within thirty days the municipality may expropriate the system of the company by arbitration under "The Municipal Act," or it may proceed to erect its own poles and wires.

9. All charges must be approved by the Board and may be placed upon the collector's roll and collected in the same manner as other taxes;

10. When a subscriber has paid all instalments of principal and interest as provided in the debenture by-law providing for the installation of his telephone, he is released from all further liability should he wish to discontinue his service.

11. In case of any deficit it may be paid out of the general funds of the municipality and collected from the subscribers in the same manner as any other debt due from them;

12. In the event of any dispute as to the validity of any rate levied in respect of the system the same shall be determined by the Board whose decision is final;

13. Persons who not being landowners are unable to become subscribers may be furnished with service at such yearly rental as may be approved by the Board;

14. Commissioners are elected each year at the annual meeting of subscribers, no person other than a subscriber being eligible for election. Until Commissioners are elected the system is under the control of the council. Any vacancy in the office of Commissioner is filled by the Council with the approval of the Board;

15. Every system must hold its annual meeting in January of each year, or at such other time as the Board may approve of. Ten days before the annual meeting each subscriber must be

furnished with a financial statement;

16. Special meetings of subscribers may be called by the Commissioners, or upon the requisition of the one-tenth of the subscribers;

17. The accounts of the system shall be audited by auditors elected at the annual meeting of subscribers, or where the system is in the control of the Council by the municipal auditor.

Part I provides for the establishment of a telephone system as a municipal undertaking in the same manner as waterworks, street railways, electric light and power, etc. Debts incurred under this Part are a charge upon the property of all ratepayers. There are, however, only five of these systems in operation, namely, the cities of Fort William and Port Arthur, the towns of Kenora and Rainy River, and the Township of Hilliard, the last named being the only system furnishing rural service. I do not purpose elaborating upon this Part as it is not in my opinion adaptable to the development of rural service.

Having covered as completely as possible in the time at my disposal the legislation governing the telephone service under the jurisdiction of Ontario, I would like in closing to make special reference to what I consider is the most important feature of telephone development in the Province, namely, systems established under Part II of "The Ontario Telephone Act".

There are ninety-five of these systems operating and in course of organization in the Province covering 215 towns, villages and townships.

Seventy-seven completed systems have erected 6,711 miles of pole lead carrying 19,815 miles of wire, and are furnishing service to 22,502 subscribers and renters. The cost of establishing these systems has been $1,630,000 or $72.50 per station.

Of these systems seventy-three are exclusively rural, furnishing service to 22,003 subscribers and renters on 6,677 miles of pole lead carrying 19,707 miles of circuit.

I have prepared a tabulated statement showing in greater detail the essential particulars regarding these systems, but time will not permit me to give more than a passing reference to these. This statement shows that the cost per station of establishing these systems ranges from $34.49 to $173.07. The normal cost per station, however, ranges from $50.00 to $100.00 the following being that of some of the best known systems:

Blyth	$97.88	581 stations
*Bruce	107.09	1196 stations
Chinguacousy	55.83	600 stations
Cramahe	90.14	355 stations
Flos	61.46	548 stations
Gosfield	63.11	345 stations
McKillop	71.83	407 stations
Otonabee	79.13	323 stations
Brooke	57.55	1002 stations
Brussels	62.18	1107 stations
Colchester	49.39	329 stations
Dawn	58.33	366 stations
Goderich Tp.	61.46	300 stations
Huron	73.00	700 stations
Medonte	50.69	434 stations
Percy	96.41	530 stations

*5 Centrals and 40 miles toll line.

The above systems were built under pre-war conditions. If established today at prevailing prices these costs would be very much increased. The following are a few examples of the cost per station of recent systems where such systems are entirely new:

Douro	$113.02	51 stations
Glenelg	125.00	56 stations
Ennismore	118.81	101 stations
*Tyendinaga	173.07	104 stations

*80% Rock: Built by day labour without proper supervision. Cost unnecessarily high.

As to the cost of service the following are a few of the annual charges including instalments of principal and interest in repayment of the debenture debt. The number of stations are shown in brackets.

$13.00	Brussels	(1107)
$15.00	Brooke	(1102)
	McKillop	(407)
	Roxborough	(245)
	Flos	(548)
$16.00	Blyth	(581)
$17.00	Mersea	(491)
$18.00	Cramahe	(355)
	N. Easthope	(461)
$19.00	Brigton	(450)
$20.00	Tilbury W.	(582)
$23.00	xBruce	(1196)
$25.00	†Paipoonge	(78)
$30.00	†Oliver	(97)
	Chinguacousy	(600)
	Haldimand	(210)
	Wellesley	(496)
	Percy	(530)
	Euphrasia	(417)
	Glenelg	(56)

x 5 Central Free Interchange

† West of Fort William

I may here point out that one of the chief advantages in the establishment of these systems is that a municipality can always secure the necessary capital for the development and extension of the telephone service to meet the demand of the public. It is a well known fact that the majority of rural companies find it very difficult to obtain new money for extensions, and as existing rates and prevailing operating costs do not admit of any profits being available to put into plant, the only remedy would appear to be the turning over of the business to the subscribers themselves by means of the machinery provided in Part II of "The Ontario Telephone Act." This has been done already in many cases with resultant benefit to the public both in the matter of service and development. Much work remains to be done along this line, for I am satisfied that the machinery I have referred to furnishes the solution of the problem of the future development of the rural telephone service.

May I say in closing that while we in Ontario are very proud of the wonderful development of the telephone service in the rural communities as a result of the initiative and progressiveness on the part of those pioneers who with no knowledge of the business put their money and energy into this work, we also appreciate the fact that this achievement would not have been possible without the assistance and co-operation of the manufacturers who produced the equipment and The Bell Telephone Company which provided the connecting link between the farmer and his shipping point, and from thence with the great centers of industry and commerce throughout the length and breadth of the North American Continent. This is the day of co-operation, and so long as we live up to the spirit of the age we may look forward to still greater achievements in the future.

High School to Offer Advanced Course in Telephony

Detroit, Mich.—The Cass Technical High School will offer an advanced course in Telephony if there are a sufficient number interested to make it practicable. The course will be open to those who have completed previous courses or to those who have at least a high school education. Classes will be held from seven to ten one evening a week. The work will be taught by H. L. Ballard of the General Plant Superintendent's office of the Michigan State Telephone Co. Among the topics proposed are "Simple Electrical Circuits," "Solution of D. C. Networks," "Elementary Alternating Current Ideas," "Fundamentals of Telephone Transmission," "Central Office Circuits," "P. B. X. Study," "Use of Auxiliary Apparatus," "Power Equipment of Central Offices," and "Toll Practices."

Couderay, Wis.—Harold F. Mann is president of the newly organized Couderay Telephone Co. Capital stock is $25,000.

"Phones for All"—Kansas Says

Kansas Commissioner Says Rates Should Make Phone Use Possible for Every Family—Compares Bell and Independents at Meeting of Utility Commissioners

By Clyde M. Reed

(Chairman, Kansas Public Utilities Commission)

There is no telephone voice in the whole country that can so authoritatively discuss these subjects as the men who have spoken here. Mr. Thayer is the head of the nearest approach to a complete monopoly in any important service or manufacturing process that exists in the country today, and Mr. MacKinnon is the head of the struggling, somewhat ineffective, remnant of the Independent telephone interests.

Whatever else may be said about the policy of the American Telephone & Telegraph Co., there can be no criticism of a lack of frankness. It proclaims its intention of perfecting and constituting a national monopoly of telephone service and sets forth in its annual reports the extent to which it has been successful in reaching that goal.

From 1876 until the latter years of the last century the Bell telephone company, due to the patents held, had a virtual monopoly of the telephone service. The Independent telephone began to be in evidence about 1900 and its spread was rather rapid.

In the first decade of the present century there was fierce strife between the Bell and Independent interests, which has been succeeded by a process of absorption, direct and indirect, of the Independent by the Bell. How far this process has gone is indicated by the last annual report of the American Telephone & Telegraph Co., which gives the total number of telephones in the United States at about 14 million, of which 8,914,155 are Bell owned. This is a percentage of the total of 63.7. The Bell connecting telephone are numbered at about 4,466,064, or 31.9 per cent of the whole.

How many of the latter classification are operated by companies in which the financial interest of the Bell predominates is difficult to estimate. At least it is clear that the acknowledged Bell ownership of the telephone interests of the country is substantially two-thirds of the whole, with a very considerable percentage to be added through control of nominally Independent companies. If the public has not understood the situation, it is not because of any attempt to conceal the facts on the part of the American Telephone & Telegraph Co.

The Congress of the United States and legislatures of most, if not all, of the states have for decades legislated upon the subjects of trusts and monopoly. The "horrible examples" which have been held up to us have been concerns like the Standard Oil Co., which controls 41 per cent of the oil refining processes of the country and 17 per cent of the crude oil produced; the United States Steel Corp., which is understood to control at this time something like 45 per cent of the steel manufacturing processes of the country, and the great packing interests, no one of which, however, controls more than about 20 per cent of the total output of the packing business of the country.

It would probably be a shock to the public mind, and perhaps a surprise to many members of this association, to realize the extent to which the telephone service of the country has passed into the control of a single interest, even though participation in the financial support of that interest may be widespread as the result of a very wise policy of increasing its available capital by diffusion among its customers, who after all are insignificant in the determination of policies; generally, as a matter of fact, without a voice, however small, in those policies.

Industry's Status

The extent to which the Bell telephone interests have absorbed and eliminated, as a serious business factor, competition from Independent telephone companies is evidenced by replies received from some of the state commissions to letters written by me in the collection of material upon which to base this discussion of the subject. Not all of the states furnished information upon this specific point, but enough of them did to accurately, I believe, reflect the situation. State commission utterances, beginning with the Empire State of New York, are as follows:

New York: "There are very few Independent companies in the state of New York. Practically all of the so-caller 'Independent companies' are controlled through stock ownership by the New York Telephone Co."

Massachusetts: "The New England Telephone & Telegraph Co., which is a Bell company, controls the bulk of the service in Massachusetts. There are but few Independent companies and they operate in sparsely-settled territory."

Maryland: "We have no Independent companies of any size operating in this state."

Tennessee: "The Cumberland Telephone & Telegraph Co. (which is a subsidiary of the American Telephone & Telegraph Co.) has competiton only with three Independent companies in this state."

West Virginia: "The Chesapeake & Potomac Telephone Co. (a subsidiary of the Bell) performs practically all of the telephone service in this state."

Colorado: "There are about 70 Independent companies in this state, exclusive of mutual companies, but these Independent companies operate in rural districts and form what may be denominated a fringe to the system of the Mountain States Telephone & Telegraph Co. (the Bell subsidiary in Colorado). Very frequently there is a partial ownership by the Mountain States company in these Independent companies, and in practically all cases the Independent companies are dominated by the Mountain States company."

Wyoming: "There are very few Independent companies, and none in competition with the Mountain States Telephone & Telegraph Co."

Washington: "It is difficult to compare the rates of the Pacific Telephone & Telegraph Co. (the Bell subsidiary in this state) with those of other companies for similar service, as practically all the principal telephone properties in this state are operated by that company."

The statements quoted may be assumed to reflect with reasonable accuracy the situation that prevails in the country. The answers quoted bar discussion on this point. From many other states similar information was received but not in a form to be so concretely quoted.

Assuming that a practical monopoly exists—and I don't think this will be seriously questioned—consideration then comes as to its effect. Telephone companies make investments, render service and collect charges. If the establishment and operation of a monopoly did not increase the investment nor impair the service nor result in higher charges to the public, the discussion would then proceed upon

academic lines, being more a matter of theory than of practice.

Such a condition would argue a rather different state of human nature than we have been prone to believe exists. It would reflect a degree of unselfishness that disregarded power and the ability to enhance profits.

It is not unfair to say that up to the present stage of the organization of our business society, these qualities have not been regarded as predominant, particularly in the great organizations that control the production of commodities and the performance of service that have come to be an essential part of our social fabric. But, if under the system of control that exists, a monopoly expensive to the public has been built up and the rendering of service is more costly than it would be otherwise, fair consideration should be given to that fact.

In Kansas, it is undeniably true that, comparing the situation as it relates to the Bell telephone subsidiary with companies Independently operated and furnishing an equally efficient service, the Bell investment is reported as being greater per station, its operating expenses are higher, the rate of depreciation claimed is greater and in many cases excessive—or so regarded by the Kansas commission—and the charges to the public materially higher.

No single phase of public utility regulation in Kansas has given the Kansas commission so much trouble; has been the subject of so much thought and concern, as the steady growth of the Bell interests following a ruthless and relentless national policy, crushing in one way or another competition and disregarding to a greater degree than any other utility in Kansas, the opinions, finding and orders of the Kansas commission. Is this situation peculiar to Kansas? I think not.

Indiana says: We believe the Bell properties are much more difficult of regulation because their operating expenses are entirely too high. The station cost of Bell telephones runs from 25 to 100 per cent greater than the Independent telephones in towns of the same size. While we admit that in many instances construction of the Bell properties is very much heavier, yet there can not be a dfference of 25 to 100 per cent n the cost. . . The Bell rates, as compared wth those of Independent companies are very much higher."

Upon this subject the calm and dispassionate voice of the old Green Mountain State of Vermont speaks:

"The public may be in some danger of being compelled to pay more than a fair compensation for use of the telephone if the Bell company continues to absorb all the smaller companies and so great a complete monopoly of the business.

"It has been demonstrated that for local purposes competition in the telephone business is not desirable, so long as there is some authority to regulate rates and prevent their becoming excessive, because competition involves duplication of capital and service which must be paid for by the public; yet if the monopoly is broadcasted over the whole country, the creature thereby created becomes so large and powerful that it is difficult to restrain it and prevent its exacting, under one form or another, more than the public ought to pay."

Some difficulty in obtaining comparison between rates exacted from the public by the subsidiary companies of the American Telephone & Telegraph Co., lies in the fact that in many of the states there is no Independent telephone operation furnishing a basis for such comparison.

In correspondence and in personal conference with members of the state commissions I have found, however, practically a universal belief that the rates charged the public by the Bell companies are greater than sound business policy and economics would justify, and greater than is charged by Independent companies where such are operated, and greater than would be charged if there were serious competition with the Bell service.

I think it follows, therefore, and is shown by the records, that the approach to a Bell monopoly of telephone service has resulted in higher charges to the public.

The next question follows: Does the monopoly of the Bell telephone company, though charging a higher price for service to the public, result in a greater development of the use of the telephone and thereby confer an economic and social benefit upon society?

Kansas on Development

The answer, out of the experience and study of the Kansas commission, is most decidedly in the negative. Using as a test the extent to which telephone service has been developed in communities served by the Bell companies, as compared with similar communities in Kansas served by Independent companies, the answer is that in the Independent communities the development of telephone service is substantially 20 per cent greater than in Bell-served communities.

In other words, in the Independent communities there is one telephone to every 4.58 persons, while in the Bell communities there is a telephone to each 5.49 persons. I may fairly say here that this is a dependable comparison. The communities used were as nearly the same size as possible. The basis of illustration is a trifle more favorable to the Bell companies than otherwise. (The result of this study is found on pages 6 and 7 of the report of the Kansas commission in its order dated June 23, 1921, in Dockets 3567-8-9 and 3642-3-4.)

A not dissimilar situation is disclosed in Minnesota, which the Minnesota commission describes as follows:

"The enclosed data will give you a general line-up of this situation which carries out your general proposition that the Independent companies have a larger development per population than the Bell.

"Two factors influence this situation. First, the factor of personal pride in a local concern, including the wider distribution of stock in the local company; and the second factor is that the rates are lower and come within the financial reach of more people.

"The problem, as I see it, of development as between the Bell company and the Independent companies is whether or not the Independent company is furnishing sufficient adequate service at the lower rate, and that the Bell company in the small community is setting too high a standard of service."

One of the Independent companies in a recent letter to its customers said: "We have spent time and real money, not merely to sell a few coils, but to the end that our customers may be able to continue functioning successfully in furnishing efficient telephone service to their communities, and protecting them against the extremely high rates sure to be exacted by a state or nation-wide organization."

Making due allowance for the business zeal of the manufacturer quoted, I am rather strongly disposed to the belief that he has correctly stated the fact.

The Bell company does not—at least so far as Kansas is concerned—hide its views on the development of telephone service. Its general counsel, in arguing a case before the Kansas commission, made substantially the following statement:

"The telephone is a luxury. Many of the present subscribers can not afford telephones because they can not afford to pay the rates necessary to maintain the service. We had just as well face that situation now as any other time."

I do not hold to these views. It is my belief, and it is the policy of the Kansas commission, that every form of public utility service—telephone, railroad, gas, electric light or water—should be as widely diffused as possible. The effort should be made to furnish some class of service on a basis rate that would meet the needs of every class of citizenship, so far as that is possible. We regard the methods and practices of the Bell companies in this respect as contrary to what we believe to be sound public policy.

If the rates charged by the Bell companies are higher than those

charged for similar service by Independent interests, and if the higher charges serve to burden business and affect its development, then what argument could be offered for a national monopoly as opposed to a reasonable diffusion of the telephone business among Independent and competing interests?

In using the term "competition" I do not mean a duplication of local exchange service—that would be a waste. I mean, however, competition as between telephone companies operating in the same sections and in the same state whereby comparison can be made of investment, expenses and rates so as to afford a basis of determining if the investment and the operating costs are reasonable. We are reaching a stage where that becomes more and more difficult, and at the present rate the opportunity will be entirely lost in a few years.

It may be said that the Bell service is more efficient. So far as the Kansas commission is concerned it grants that, if comparison is to be made between Bell service in cities and large towns with the small Independent plant in the smaller towns and villages. But that is not a fair basis of comparison.

Our experience has been that comparing community with community, size for size, and condition for condition the Independent service in Kansas is substantially equal to that of the Bell. That view is also expressed by numerous state commissions in their replies to my inquiry.

It may, and will be, urged for the American Telephone & Telegraph Co. that its research and scientific work has been most valuable in the development of the industry. I grant that without argument. It may be fairly offered, however, that the large Independent manufacturers, even though their business has year by year been slipping away through absorption of Independent properties by the Bell monopoly, have contributed their share toward this development. And the acid test would be that Independent companies, operating entirely outside the Bell influence and without use of the Bell equipment, have been able to furnish a service substantially equal in efficiency to the Bell service.

It is my belief that there is no service which the state commission can render to the public greater than that of acquainting it with the telephone situation as is exists. To my mind the rapid pace at which we are traveling toward a complete telephone monoply in the country is a threat to the public service, and will impose a burden of hundreds of millions of dollars upon the users of telephone service both local and long distance.

I have found no disposition on the part of the American Telephone & Telegraph Co. and its subsidiaries to cheapen the cost of service without impairing its efficiency. Our telephone service is the best in the world, but this applies to Independent service with equal force, and our telephone rates, partcularly many long distance rates, are and should be recognized as an economic scandal.

RESEARCH WORK OUTLINED

E. H. Colpitts Tells Big Crowd of Telephonic Development —Demonstrates

Chicago, Ill.—Before a crowd which packed the Aryan Grotto, E. H. Colpitts, Asst. Chief Engineer of the Western Electric Co., presented an illustrated lecture and demonstration on "Research in the Art of Communication." The lecture was given under the auspices of the Telephone, Telegraph and Radio section of the Western Society of Engineers.

More than a ton of apparatus was shipped from New York and a force kept busy for several days in assembling equipment for the demonstration. Films showing telephone research work conducted in the laboratories of the Western Electric and Bell companies were shown.

Employing loud speaking equipment, Mr. Colpitts told of the work that is being done by the 3,000 people in the ten-story building devoted to research work in New York by the Western Electric and Bell interests. He demonstrated carrier current operation and outlined its uses and limitations. Toll development and a brief description of the methods employed in the Bell's long distance activities also formed an interesting phase of the lecture.

Considerable interesting treatment was given to the study of speech that has been made by the telephone engineers. Referring to the slight mechanical effort necessary for speech, Mr. Colpitts said that one of his associates had figured that a million people would have to speak for a minute and a half in order to generate enough heat to make a cup of coffee.

Paris, France.—A telephone and telegraph cable, costing 100,000,000 francs, is to be laid between Paris and Strassburg.

Waterloo, Ia.—Former Governor Horace B. Boise has had the same telephone number for 40 years, No. 1. He had the first telephone installed in Waterloo.

PROTECTS CABLE

Compound for Underground and Aerial Cable Offered by Indiana Maker

Mitchell, Ind.—With the growing use of underground cable without conduit, efforts have been made to perfect a protective compound that would minimize the destructive effects of soil conditions, rats, etc. A compound that is being widely and successfully used for this protection is the Ever-Protect, manufactured by the National Cable Compound Co. of Mitchell, Ind.

Those responsible for this compound state that it neutralizes the corrosive action of waste from ice and gas plants, stockyards, stables, toilets, manure piles, cinders and blacksmith shops. Decay of certain woods in earth, also destructive to cable, is offset by Ever-Protect, according to its inventors. Another one of the virtues claimed for the compound is its neutralization of certain alkali conditions found in soils of southwestern states. Destruction caused by electrolysis and from defective cable sheat and improper joint wiping also is prevented in many cases by the use of the compound, say the Ever-Protect sponsors, who add, checked and open joints in aerial cable, coated with Ever-Protect are unaffected.

Qualities of Ever-Protect compound are said to be flexibility, good cementing qualities that assure adhesion to the cable and durability.

Everstick Anchor Increases Factory Facilities

St. Louis, Mo.—For the second time in two years the Everstick Anchor Co. has been forced to increase its factory facilities. A new extension adding 3,000 sq. ft. of floor space, is being constructed to care for the increase in anchor and cable ring business. Telephone men interested in the success of the Everstick company's head, Jasper Blackburn, will be interested to learn that he is responsible for a perfected mechanical gear shift for automobiles which works without the customary gear shift lever, and for a steering wheel that carries all switches for an automobile's electrical equipment, with a horn contact the full circumference of the wheel. These two inventions have been favorably received by the automobile industry and stand a good chance of being standard equipment on some well known cars within the next season or two.

A. I. E. E. T. & T. BODY REPORTS

Electrical Engineers' Committee Reviews Year's Progress—Makes Suggestions.

The annual report of the Telegraphy and Telephony Committee of the American Institute of Electrical Engineers appears in the December Number of the Journal of that body. The report first calls attention to the fact that the Institute has served to a greater extent than ever before as a clearing house for information dealing with technical advances in telegraphy, telephony and radio communication, one direct result of which is the growing number of communication engineers applying for membership. A number of specific topics are treated in the body of the report.

One of the suggestions made is that the Protective Devices Committee of the Institute include in its investigations a study of the problems of communication line and apparatus against lightning and accidental contact between power and communication wires. Reference is made to progress in the co-ordination of signal and power circuits during the year and mention is made of the joint work of the American Telephone and Telegraph Co. and the National Electric Light Assn. Automatic telephony has also progressed, although there is nothing particularly new to report in the way of engineering changes. In telegraphy, the use of multiplex printing telegraphs is increasing and the Postal Telegraph-Cable Co. has once more placed a printing telegraph system in service.

Trans-oceanic commercial radio telegraphy has continued to improve in reliability and the volume of traffic has steadily increased. On the Pacific Coast continuous radio telegraph service is performed between important coast cities. In radio telephony, although several scientific developments and inventions could be recorded, the great work has been the extensive application, increase in power and quality of transmission and the increase in efficiency and simplification of receiving equipments. The design and production of high efficiency instruments suitable for the novice with simple operation and suitable in appearance for the living room has been an engineering development worthy of note.

In the field of railroad telegraphy and telephony, plans reflect the general interest in radiophone developments. It is anticipated that it will have a field in train operation for communication between caboose and engine. There is also a demand for portable radiophone sets for use in bridging gaps temporarily when washouts or floods destroy pole lines, Radio telephony also affords an opportunity to maintain communication between tug captains and tug dispatchers at large seaports.

Among the developments in telephone cables were the extension of the aerial cable plant of the American Telephone and Telegraph Co. between Harrisburg and Pittsburgh, a distance of 200 miles. Communication was established in 1921 over the submarine telephone cables between the United States and Cuba. These cables are 104.9 nautical miles long, are loaded and employ vacuum tube repeaters at the terminals for connection to land lines.

In large cities it becomes necessary to establish branch telegraph offices and this has led to the extensive use of underground pneumatic tubes between the main offices and branch offices. While the initial expense is large the annual charges are found to be less than the cost of handling large numbers of messages by wire. Tubes are 2¼ inches in diameter and are laid in pairs in order to handle traffic in both directions simultaneously. Power is supplied by reciprocating air compressors for large systems and by rotary pressure blowers for small systems.

The report of the Standards Committee last published contains for the first time a representative list of terms and their definitions employed in communication engineering. Most of these definitions were prepared by members of the Telegraphy and Telephony Committee. The terms incorporated in the published report constitute a good start and the present year's sub-committee will undoubtedly add many more definitions.

In outlining future activities, mention is made of the delay in preparing a Bibliography of Communication literature pending the return of more favorable printing costs. It is also noted that practically all of the technical papers have come from members of the New York Section. It is hoped that the various Sections will encourage communication engineers in their territory to prepare papers for Section presentation. The report is signed by Donald McNichol, Chairman.

Aberdeen, So. Dak.—W. G. Bickelhaupt has been elected president of the Dakota Central Telephone Co., succeeding J. L. W. Zietlow, deceased. E. E. Ingham was elected treasurer, and B. C. Lamont, secretary, at a recent special meeting.

"BIG GUNS" BOOM

Expert Testimony in Indiana Bell Case Reveals Heavy Ammunition of Opponents.

Indianapolis, Ind.—An investigation of the Indiana Bell's entire operations in the state, with particular attention being directed to the 4½% licensee fee paid the A. T. and T. Co. is living up to its promise of becomnig the most thorough inquiry of the kind ever attempted.

The commission and the cities affected by the Indiana Bell's plea for increased rates, are represented by a host of attorneys and experts. The Bell has an equally imposing array of legal and technical talent on its side.

Frank L. Rhodes, A. T. and T. engineer, presented testimony in defense of the 4½% contract. Independently made equipment was lauded by M. D. Atwater, witness for the commission.

"Dresser" Exchange Tribute to Indiana's Anthem Author

Terre Haute, Ind.—Being inspired by the general and hearty response to "On the Banks of the Wabash," played at an Independent telephone convention, Hart Farwell, President and General Manager of the Citizens' Independent Telephone Co. of Terre Haute, has named the company's new exchange, "Dresser," in honor of Paul Dresser, composer of the famous Hoosier ballad. The idea of the utility magnate has been very favorably commented upon by Indiana newspapers.

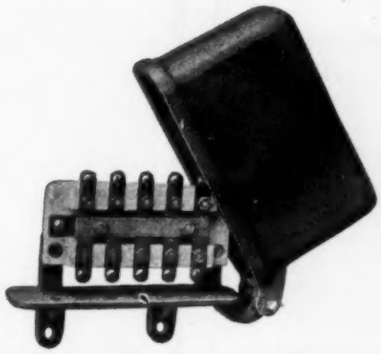
"Say It With Switchboards" Indiana Greeting Idea

Ligonier, Ind.—H. E. Inks of the Ligonier Telephone Co., gave his subscribers a Christmas gift by placing an order with the Leich Electric Co. for a three position Magneto Multiple Switchboard. The subscribers will get the benefit of the improved service very soon after the board is delivered as no change is necessary in any of the racks and the board is completely assembled in the factory. The installation requires only a few days and the cut over will be made without interruption in service.

The new magneto multiple switchboard has an ultimate capacity of 600 lines with present equipment for 430 lines. The jacks are fully multipled in each four panels and the line signals restore from jack in any position when call is answered. The call distribution is good as each operator is able to answer calls originating in any position, thus not allowing calls coming in on a busy position to be delayed in being answered.

Uninterrupted Use of Telephone Wires

Drains Wires of Lightning Without Attention



OPEN WIRE LEADS

CAST IRON CASE

No. 202 SELF CLEANING Sawtooth Lightning Arrester for draining two to ten wires at the crossarm

Reliable Electric Company

3145 Carroll Avenue, CHICAGO, U. S. A.

Cable Is Banquet Menu for Minnesota Gophers

Spring Grove, Minn.—J. W. Johnston, hunting cable trouble for the Spring Grove Telephone Co., ran across more than a dozen cases where gophers had chewed the lead sheath from cable, and exposed the core for 12 to 15 inches. The cable was laid in a trench having about four inches of sand at the bottom. The gophers, digging between mounds, discovered that the sand afforded easy going and paused along the sandy underground passage to nibble a epicurean lunch of cable. Now the telephone company has offered a premium in addition to the Minnesota state bounty for pocket gophers.—*Kellogg's Telephone Facts.*

O. D. Street, Distribution Expert, Organizes Own Company

New York City.—O. D. Street, General Manager of Distribution of the Western Electric Co., has resigned his position to organize a company of consulting specialists to deal with questions affecting management and distribution. Mr. Street has been connected with the Western Electric Co. for 22 years, most of that time in an executive capacity, and for the past ten years has been in charge of the company's operations through its chain of 50 distributing houses.

Bell Contract Relations Under Fire in Oregon

Salem, Ore.—The relations between the American Telegraph Co., the Western Electric Co. and the Pacific Telephone and Telegraph Co. are again under fire in Oregon. The Public Service Commission of Oregon has recently addressed a circular to the Public Service Commissions of the various states in an endeavor to enlist their interest and co-operation in its endeavor to bring some action under the Clayton Anti-Trust Law. The Oregon Commission has taken the stand that the telephone companies are common carriers and are therefore subject to the provisions of Section X of the Clayton law, which provides that common carriers shall have no dealing or contract for more than $50,000 in any one year with another corporation having certain officials who are at the same time officials of the common carrier. The Pacific Telephone and Telegraph Co. holds a contrary view and in response to an order requiring an explanation of the relations between the associated companies, the Vice-President and General Attorney of the company stated that the company was not a common carrier, that the Section mentioned applied only to common carriers and that the company does not have upon its Board of Directors as its president, managers, purchasing agent or selling agent any person who is at the same time a director or manager, purchasing or selling agent or who has a substantial or any interest in the Western Electric Co. Just what action the Oregon Commission proposes to take is not stated specifically in the communication but as action under the Clayton law provision must be taken by the Attorney General of the United States upon filing of information by the Interstate Commerce Commission, it is probable that the matter will be taken up with the Attorney General to ascertain whether or not his department will take action if a presentation of facts is made by the Interstate Commerce Commission.

Illinois Bell 1922 Business Runs Into Big Figures

Chicago, Ill.—In a summary of Illinois Bell Telephone Co. activities for 1922, President W. R. Abbott says the company spent approximately $18,000,000 for new construction. In the next five years it will spend nearly $100,000,000 for additional facilities. About 54,000 stations were added during 1922, Chicago's gain alone being 32,000. Traffic in Chicago runs more than 3,000,000 calls a day. The company's engineers forecast a 4,000,000 population for Chicago in 1940.

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STEEL PRODUCTS

The Lyon Head Set Cabinet is just one of those Lyon Steel Products designed especially for telephone requirements.

If it is something in which to store things — Lyon has it.

The nearest District Office can tell you.

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with our guarantee that it would **make good,** was what we started with.

Warner Pole Changers

are **keeping our word** with 25,000 users.

Think it over—

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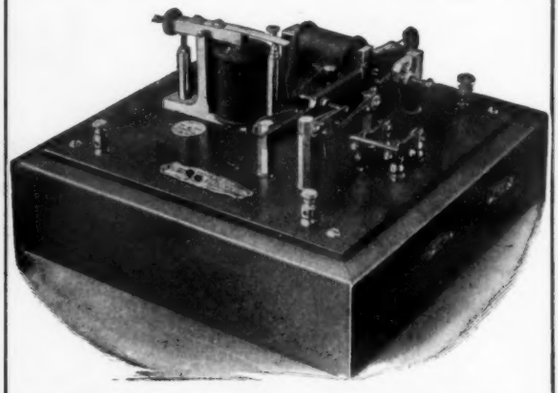

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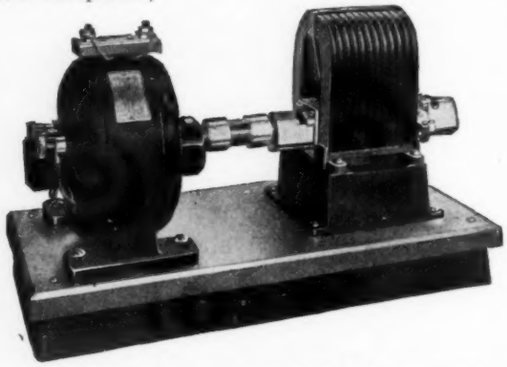
RINGING SERVICE

It's Up to You What Kind You Give

If you use ringing equipment that you must constantly adjust, you are bound to give poor service. Even hand generators at such times don't help much. Cranking a generator for every outgoing call necessarily slows the operator in answering the incoming ones, and the subscriber still complains;



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The Holtzer-Cabot Electric Co.

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BOTH trucks are standing still but one is busy while the other is doing nothing.

The **busy** truck above is being loaded by means of its own Mead-Morrison Underslung Winch, which also sets poles and hauls cables with equal speed and efficiency.

The **idle** truck below is idle because it has no winch. So you see a gang of eight men wasting time on the slow and costly process of pole raising with pikes where three men with a winch could make a quick job of it.

The upper view also shows the advantage of position of the Mead-Morrison Winch under the rear of the truck, ready for instant use but **out of the way of the load.**

Our nearest agent will be glad to give you full information regarding details of construction and records of performance of Mead-Morrison Winches.

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MEAD-MORRISON WINCHES

FOR CABLE HAULING AND POLE SETTING

Practical Plant Problems

Chapter X—Cable Splicing Methods Continued

By Charles W. McKay, Associate Editor

In the December installment methods of splicing "non-diminishing" cables were discussed. In further amplification of this subject, it may be said that the non-diminishing cable is the result of an evolutionary process. Ten or fifteen years ago a carefully designed "diminishing" cable was considered the acme of perfection in underground cable installation. The diminishing cable was given a thorough trial in New York City—with most unsatisfactory results. The city grew so fast—and the centers of population shifted so frequently—that it was impossible to design a diminishing cable which would render satisfactory service for more than a few months. Of course every time a diminishing cable had to be relieved, resplicing and "throws" were necessary at every diminishing (and some of the intermediate) points. Obviously, a relief process of this nature is very expensive.

To further illuustrate the point at issue an illustration of a diminishing cable is presented in Fig. 24. It is suggested that the reader picture to himself the steps involved in relieving such a cable—in a rapidly growing community—as compared with the method of feeder cable relief outlined in Figs. 22 and 23—as presented in the December issue.

To relieve the original diminishing cable, many expensive "throws" would be necessary. Furthermore, the cable pair—within the diminishing cable itself, would have to be entirely re-arranged. Imagine the cost—and compare this cost with the expenditures involved in providing relief by the methods described in connection with Figs. 22 and 23.

The writer knows of one case where a diminishing cable was installed after the engineers had taken into consideration (what seemed to them) all future possibilities for the community to be served by the cable and had worked out every splicing detail to the last degree. One year afterwards, the City approved plans for a new transportation system, property values soared; large apartments were erected. The net result—the original (estimated) pair requirements were greatly exceeded and the diminishing cable did not lend itself to any economical plan of relief. Eventually it was removed entirely.

In the February instalment, branch cables (interior block and building cables) will be discussed.

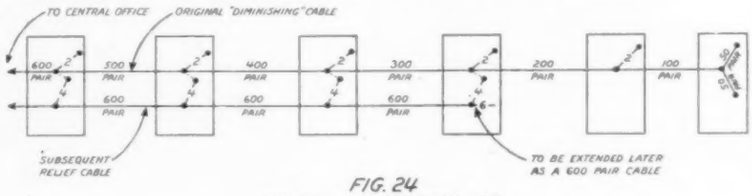

FIG. 24
TYPICAL ILLUSTRATION OF OLD FASHIONED "DIMINISHING" FEEDER CABLE.

NOTE:- DOTTED LINES (---) IN MANHOLES INDICATE POINTS WHERE BRANCH THROWS AND SPLICES WILL PROBABLY HAVE TO BE MADE TO RELIEVE ORIGINAL CABLE.

Johnston Engaged as Expert in Indiana Bell Case

Indianapolis, Ind.—J. K. Johnston, the well known telephone engineer of Indianapolis, has been engaged to make an examination of sixty or more exchanges in Indiana with a view of determining the advisability of rehabilitating the present central office equipment of the exchanges, and installing more modern features. Mr. Johnston's work is a detail of the Indiana Public Service Commission's investigation of the Bell's revenue and expenses, in connection with its application for increased rates.

Standard Underground Moves Its Boston Office

Boston, Mass.—F. C. Cosby, Boston manager for the Standard Underground Cable Co., announces removal of the Standard's Boston office to 609-612 Unity Bldg., 185 Devonshire St.

Monarch Announces Location of New Chicago Home

Chicago, Ill.—All manufacturing and office work of the Monarch Telephone Mfg. Co. now is being done at the company's new home at 951 W. Van Buren St., Chicago. The moving of all factory and office equipment from Fort Dodge, Ia., where the Monarch had been located for 11 years, to Chicago, was made without a hitch. Monarch requests that all correspondence be sent to the Chicago address. The Chicago factory supplies Monarch with improved facilities for manufacturing and shipping equipment of its own manufacture and the jobbing supplies.

Nashville, Tenn.—Tennessee public utilities will use new capital during 1923 at the rate of $16 a minute.

T. J. Shufflin, Independent Veteran, Dies at Butler, Pa.

Butler, Pa.—Thomas J. Shufflin, promoter of the People's Telephone Co., the first treasurer of the old United Independent Telephone Association of America, and one of the foremost business men of Butler County, died suddenly, Saturday, December 16, of acute inflammation of the heart muscles. Mr. Shufflin went into the telephone business in 1893 when he was associated with J. H. Forsythe in building a line from Butler to Glade Mill during an oil boom. He was director and treasurer of the People's Telephone Co. of Butler at the time of his death. He had been active in national and district association work. He also was a moving spirit in many commercial and social organizations in Butler.

"COPPERWELD" Telephone Wire

TRADE MARK REG. U.S. PAT. OFF.

Made by The Molten Welding Process

Where No. 10 hard-drawn copper or No. 12 BB Galvanized iron telephone wire would be used, a No. 12 Copperweld Telephone Wire may be properly selected. 70 lbs. excess weight of wire per mile is avoided.

	Diam.	Breaking Weight	Weight per Mile	Relative Factor of Safety: With ½" Ice and 8 lb. Wind Pressure	Relative Factor of Safety: With 15 lb. Wind Pressure, No Ice.
10 B&S hard-drawn Copper	.102"	528 lb.	166 lb.	98%	80%
12 BWG BB Galvanized Iron	.109"	476 "	170 "	88%	68%
12 B&S Copperweld	**.081"**	**520 "**	**96 "**	**100%**	**100%**

Copperweld does not rust. It stays up under sleet loads and wind pressure when other wires would be wrecked.

COPPER CLAD STEEL COMPANY Braddock P. O., Rankin, Pa.

Chair Builders
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Write us your special requirements in Steel-and-Wood & All-Steel Adjustable Chairs and Stools.

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Absolutely pure water for less than one or two cents a gallon, no matter how polluted your supply of water may be. For drinking, chemical or battery purposes the Peerless stills give you the best, ample supply at lowest cost. Operated without attention other than occasional cleaning.

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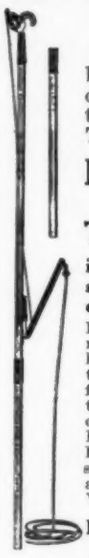

Trim Now—

before those sleet-laden dead branches fall onto the wires.
The handy rope-pull type

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TREE TRIMMER

is designed especially for such work and does it easily, quickly and safely.

It is insulated; operated by a rope-pull and a 14-inch pull lever which increases the cutting power. Two additional four-foot sections can be added to main section so as to make over all length 16 feet.
Every tool is guaranteed.
Bartlett Tree Trimmers are standard with leading telephone and telegraph companies.
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Royal Presents Complete Line of Standard and Special Operators' Chairs

Chicago, Ill.—Telephone men, interested in comfortable and durable chairs for their operators and other exchange uses, will want to investigate the "Royal-Chicago" line, made by the Royal Metal Mfg. Co., 2318 S. Western Avenue, Chicago. This concern makes a number of models that have proved very satisfactory for operators and others, in both city and rural exchanges. In addition to its standard patterns, the Royal Metal Mfg. Co. makes special types for all requirements and solicits your inquiries and suggestions in that respect. Their stools and chairs are all constructed of steel, mainly of Bessemer rod, angle iron and steel tubing, all constructions being the strongest possible, and fully guaranteed for ten years against breaking or coming apart. In addition to several types of adjustments on the back-rests which permit them to be raised and lowered, they manufacture three different types of leg adjustments so that the seating can be set at the height to suit the individual operator. Their main adjustment, the "Press-to," is quite well known because of its cleverness and simplicity. The height of the seat is lowered by simply pressing a button, and is raised by lifting the seat. All the chairs are furnished with wood back-rests. Wood seats, both round and saddle, also steel seats, are furnished as desired.

Standard

Rubber Insulated Telephone Wires

include a wide variety of high grade products, among which are:

Plain Terminal or Pothead Wire
Glazed Braided Switchboard Wire
Flameproof Braided Switchboard Wire
Weatherproof Bridle and Drop Wire

For further information write for Bulletin 500

Standard Underground Cable Company

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Note Protection at Corners

Blake Insulated Staples

Unequalled for telephone and bell wiring. The fiber insulation prevents troublesome short circuits and grounds. 4 sizes. Pat. Nov., 1900. Write for samples.

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BOSTON, MASS.

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Supply your subscribers with one of these **better service** devices.

1—Provides a ready holder for the desk set, where it is within convenient reach for instant use.

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